

LEARNING HOW TO
STUDY AND WORK
EFFECTIVELY
BOOK

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LEARNING HOW TO STUDY AND WORK EFFECTIVELY

A CONTRIBUTION TO THE PSYCHOLOGY
OF PERSONAL EFFICIENCY

BY

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GINN AND COMPANY

BOSTON • NEW YORK • CHICAGO • LONDON
ATLANTA • DALLAS • COLUMBUS • SAN FRANCISCO

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PRINTED IN THE UNITED STATES OF AMERICA

426.8

374
B724

The Athenæum Press
GINN AND COMPANY • PRO-
PRIETORS • BOSTON • U.S.A.

PREFACE

Much interest has been shown of late in the study of learning and in determining exactly how progress in learning takes place.

One of the most important and universal types of human acquisition is learning how to work at one's tasks in the most effective way. Educational leaders throughout the world, and the most ambitious individuals amongst us, are becoming intensely interested in this type of learning and in the facts which reveal just what must be done to facilitate improvement in this direction. Teachers are beginning to see that students waste a vast amount of time and form many harmful habits in school because they do not learn to work in the most efficient way. The recognition of this condition has given rise to a rather widespread movement toward *supervised study*, which in its better forms aims to produce an individual who has learned to work at all his tasks in the most effective and economical way.

The chief aim of this book is to delineate as clearly and accurately as our present stage of knowledge of the subject will permit the exact road over which a person must travel who desires to succeed in this type of learning. It seeks to awaken an interest in a new type of teaching, one that aims to develop effective methods of work rather than merely to aid in the accumulation of information about a long array of more or less unrelated subjects.

The facts that are here assembled, interpreted, and systematized will be of interest and practical value to the following groups :

Students enrolled in orientation classes and in special courses designed to teach them how to study will find the contents of

special interest and service. This book was, in fact, primarily designed and written as a textbook for such classes.

Teachers in charge of courses in supervised study may use the book as a guide in their work, because it gives the kind of help they need if they are to direct their students in the most effective way. The information given should enable such teachers to place their supervisory work on a solid psychological basis which will insure the formation in their pupils of the particular habits that must be established if they are to learn to apply themselves to all their tasks in the most effective way.

Heads of departments in business and industry who are trying to raise the general level of efficiency of their workmen will find here a method and technic for so doing, together with a discussion of the laws that control personal efficiency in every field of work. The book will be especially useful where schools or study clubs are maintained for employees.

Individuals interested in increasing their own personal efficiency also will find these discussions of value because they attempt to show just what such persons must do to learn to work in a more effective way.

The general method followed throughout the book is first to illustrate and explain the important factors that contribute to the total efficiency of a worker, then to outline a procedure for the attainment of the specific habits that must be formed to achieve the desired result. This latter help is given in the form of practical exercises which accompany the explanation of each principle and law discussed. These experiments should not be slighted or omitted, for in addition to giving actual practice in the formation of these necessary habits they provide a way of measuring the kind and amount of gain that is being made. This makes it possible not only to know at any given time how one stands in regard to the particular element of personal efficiency under discussion but also to repeat the experiment on successive days or weeks, until the habit is thoroughly established.

The particular subjects treated in the book are those which a complete analysis of this type of learning has revealed. The sequence in which the materials are presented is that of the natural development of the problem. In special classes and for individual students this order may be changed where this proves desirable; for example, Part II may be omitted until the problems in Parts III and IV have been worked out or discussed. But in any event such chapters as those on "Ideals," "Conservation and Control of the Energy Used in Study and Other Types of Work," and "Will" should be carefully studied at some time during the course.

In reading the book, however, it should not be understood that the author has attempted to settle the much-mooted question of the relative importance of heredity and environment in the making of the individual, or to determine and explain the comparative importance of family and racial endowments and of social inheritance in bringing about the changes produced in an individual during the process of learning. The author is not concerned in this book with these fundamental or philosophical questions. He has merely taken human nature as it is, taken the surroundings in which a student or worker may be placed as they are, and tried to point out how one may best utilize his own particular endowments and his environment in making himself more efficient in doing the things that he desires to do. The task of making oneself truly efficient in his work is considered throughout the book merely as an instance of learning which the author has tried to analyze somewhat in detail in order to present the facts that would enable any worker to acquire in an economical way the particular habits that make him efficient in his thinking and work.

And since the book attempts to show just what a learner must do to acquire the ability to work in the most effective way, the treatment must be somewhat subjective. But in nothing that is said does the author mean to imply that a worker has unlimited control over his environment or over

the social and objective worlds in which he is placed. If the mode of treatment should ever suggest such an idea to the reader, it should be promptly dismissed, for the author recognizes the great force of external stimuli in this and other types of learning as well as the value of the psychological or subjective drives that operate as inner urges toward one or another type of behavior. With the more fundamental and philosophical problems involved in this and all other types of learning the author does not attempt to deal. He has no philosophy or psychological system to champion or defend. He has merely tried to set forth the facts pertaining to this type of learning in a way that would make them of direct practical assistance to all who desire to make themselves more efficient in their work.

That the author's obligation to efficiency engineers, to investigators in many fields of psychological research, and to writers on this and related subjects is very great will be apparent to anyone familiar with the literature of the field. No attempt is therefore made to render specific acknowledgments in the text, because the results of all the workers in the field have been freely consulted and used in the preparation of the book. The author is under special obligation to Professors J. R. Kantor and George S. Snoddy and to Mr. Edgar L. Yeager, colleagues in the department, for reading the entire manuscript and for helpful suggestions. Many suggestions have also been made by the author's many extension students and by certain members of the "How to Study" classes conducted at Indiana University during the past two years, in which the manuscript of this book has been used as a text. Much credit is likewise due Miss Florence Kirlin for assistance in obtaining greater clarity of expression and a better arrangement of the materials presented in the text.

WILLIAM FREDERICK BOOK

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LEARNING HOW TO STUDY AND WORK
EFFECTIVELY

PART I
THE PROBLEM OF PERSONAL EFFICIENCY

CHAPTER I

NEED FOR GREATER EFFICIENCY IN STUDY AND WORK

Two decades ago a great German scientist was lecturing to his class on the history of chemistry. He was telling them about the achievements of the founders of this great science: the work they had done, the contributions they had made, and the great value to the world of their discoveries and work.

In his class were students from every civilized country in the world. At the close of the lecture a Japanese student approached the professor and asked him how such efficient men were produced. He inquired what a student must do to become such a leader as had been described. He wanted to know how a nation must proceed to produce such eminent men in science, in philosophy, in education, and in the fields of music and art.

Professor Ostwald, somewhat surprised by the question so earnestly asked, frankly told the inquirer that he did not know; that he could not tell him how they were produced.

"But," said the student, "I must know. You must help me find out. My country must know. I was sent here by my country to find this out. When I go back they will expect me to tell them how such leaders may be developed in our schools. I wish to become such a leader myself."

This question asked by this earnest student presents the greatest human problem confronting the school and the state. It is in the mind and heart of every conscientious student and every young man and woman who earnestly desires to attain the greatest possible success in life. What kind of person attains the highest type of success? What mental character-

istics and habits do such persons possess? How may the greatest personal efficiency be attained? What must *I* do to learn how to work in the most effective way?

It is the purpose of this book to give earnest students and others some help toward a solution of this personal question by charting as accurately as possible the exact road over which they must travel if the greatest personal efficiency in their study or other work is to be attained.

1. WASTED HUMAN ENERGY AND TALENTS

The need for greater personal efficiency in every field of human activity is apparent to all. Most human energy is wasted because many persons have not learned how to conserve or how to use their time and energies in the most effective way when confronted by their tasks. This is well illustrated by a story told the writer some years ago by a very shrewd and successful traveling salesman in the West. One day this salesman called on a new customer to sell him some goods. He found Mr. X sitting at his desk, surrounded by telephones, pestered by a half-dozen clerks and subordinates, tearing viciously through a mountain of mail, approving papers submitted to him, giving interviews to two other salesmen, snapping out orders to his stenographer, and sending hurry-up calls for one or another of his assistants.

He was so "busy" that he insisted on talking to this salesman while he read letters and answered calls on the telephone. The salesman, knowing that it was time wasted to talk to Mr. X while his attention was thus distracted, tried to arrange another interview later in the day, but Mr. X cut him short, saying that he would be too busy to see him. When the salesman suggested that he could talk to him either at his office or at the club that evening, when they would be free from interruptions, Mr. X smiled in a superior sort of way and said, "My dear sir, there is little chance of that, for I am busy here at the

office every night until midnight." After this the salesman left, determined not to call on this man again.

Two years later, however, he returned to the same town, and called on Mr. X again, but was surprised to see how much he had aged in so short a time. The lines on his face were deeper, his hair had whitened, and he was pale and nervous.

He was "busier" than ever. He turned feverishly from one duty to another, and was obliged to leave several tasks unfinished because of repeated interruptions.

He told the salesman he had been keeping up this pace for about ten years, but hoped soon to get his affairs in such a condition that he would be able to take life a little easier. Then he said with a sigh: "For a year or two longer I must keep my hand on all these details. It is difficult to get reliable help. If I could only find the time, I should like to train several good lieutenants to take some of the burdens off my shoulders. But I am driven so hard that it is impossible to find the time to do it."

A year later his business was almost a wreck, and Mr. X had completely broken down.

This same salesman called on another customer, Mr. Y, who represents a very different type of business man. His call on Mr. Y was by appointment, just as his first call on Mr. X had been. When he arrived at the office, he found Mr. Y's desk clear, and the whole atmosphere of the place quiet, harmonious, and unhurried.

"How much time can you give me?" the salesman asked.

"Take all the time you need to say what you have to say," Mr. Y answered, with a smile.

They talked together fifteen minutes and transacted all their business. During this time Mr. Y did not depart for a moment from the business in hand. All his inquiries were direct, pertinent, and in logical sequence. He did not wrangle over irrelevant details. He never paused or hesitated in an agony of indecision; neither did he render snap judgments, but took

plenty of time to get all the facts, which he weighed very carefully, so that when the time came for a decision he decided promptly, vigorously, and once for all.

Mr. X was a proprietor of a comparatively small business which netted him little more than a decent living. Mr. Y was a master executive of a string of large department stores with a big selling organization, and earned more in a month than Mr. X earned in a year.

Mr. X had been in business for twenty years, a business which he had inherited in splendid condition from his father; Mr. Y had started in business as an errand boy at \$6 per week. Mr. X worked from twelve to eighteen hours every day without a moment's pause for relaxation or rest. Even at his meals he had one or more of his lieutenants with him for a conference. Mr. Y spent only four hours a day at his office. During this time he would at certain intervals get up from his chair, stretch, take several deep breaths, and then sit down for three or four minutes in an easy-chair to relax both his body and his mind completely.

Mr. X attacked every day's work with the greatest physical and mental intensity which he could command. His mind was always in a strain, his muscles were always tense. He never let down for a moment. Mr. Y began every day's work calmly and quietly and with the easy, comfortable feeling that he had plenty of time to attend to everything demanding his attention.

Mr. X's decisions were always made hurriedly and were generally based upon insufficient data, or they were postponed, dragged along, and, if finally made at all, made in sheer desperation and with the feeling that they might be wrong. Mr. Y's decisions were calm, deliberate, based upon complete information, always on time, and made with so much confidence that they carried weight with every man down through the entire business organization.

Mr. X always did that which pressed hardest for attention,

dropping it as soon as something else appeared which seemed more urgent. Since he was too busy to develop a proper sense of proportion, he wasted a great deal of time on trivial details. His most important duties, such as creating ideas and making plans for future development, properly organizing his business, training his subordinates, and studying the latest developments in his line of business, were entirely neglected.

Mr. Y had his four hours at the office carefully planned in advance. He took up his problems and duties in their proper order, allotting to each a sufficient amount of time to do it thoroughly and on time. During the period assigned to any task no other task was permitted to intrude or to interrupt. He was able in this way to attend to the most important considerations without neglecting any minor affairs.

Working as he did, Mr. X was never really able to concentrate on anything. His mental and physical power was so diffused that about 75 per cent of it was wasted. Of the remaining 25 per cent probably half was spent in doing needless things, things that subordinates could have done just as well or better, and things that resulted from hurry, worry, bad judgment, and lack of concentration. Mr. Y, knowing that he had assigned to each duty all the time that it needed, and knowing that he would not be interrupted, was able to concentrate the entire power of a vigorous, healthy mind upon each problem as it arose.

In the opinion of the author of our story, Mr. X wasted fully 75 per cent of his energy in worry and mental distraction. Fifty per cent of the remainder was spent in doing things that were useless. This meant that he applied only about 12 per cent of his energy effectively. In other words, out of the fifteen hours Mr. X worked each day, only about two full hours were profitably employed. Moreover, the quality of the mental effort used during these two hours was so vitiated by the fatigue produced by the worry and work of the other thirteen that they were only about half efficient. This would

make Mr. Y's four hours a day worth to himself and to the world about four times as much as Mr. X's fifteen.

The native endowments of these two men, the salesman thought, were about equal. The difference consisted wholly in the way they had learned to conserve and use their available energies and skill. Mr. X wasted most of his energy and talents because he had not learned how to work in an effective way. Mr. Y had learned how to conserve and effectively use both his energy and his available time.

Many individuals, especially students and teachers, work like Mr. X. A few have learned to work like Mr. Y. Personal efficiency in study or other work depends in the first place upon how effectively one's time and energy can be applied to his tasks.

2. WAYS IN WHICH HUMAN ENERGY MAY BE CONSERVED

What is of special importance for students and workers, therefore, is to learn to utilize all the time and the energy that they possess. This may be done (1) by using a more economical method of work, as has just been pointed out, and (2) by preventing unnecessary fatigue. Few students and workers realize how much human energy might be saved if only they would learn the art of conserving it by forming the habit of taking frequent short periods of rest for the complete relaxation of body and mind.

The value for personal effectiveness of planning to devote such short periods of time to complete relaxation and rest is clearly shown by the experiments of Taylor and others. Taylor watched a gang of men employed to load pig iron on flat cars. All these men had to do was to stoop over, pick up a ninety-pound piece of iron, carry it onto a car, and drop it. In this way each man observed was loading on an average twelve tons of pig iron each day that he worked.

But by studying their movements and by working out a

schedule whereby the necessary movements were interspersed with frequent periods of time for complete relaxation, an efficiency expert was able to direct these men in the use of their physical energy so that they could on an average load forty-seven tons a day with no greater fatigue than when they were each loading only twelve tons a day.

If a man is able to perform nearly four times as much physical labor merely by taking brief periods of rest at the right intervals, it is easy to see how great the saving for students or mental workers would probably be if they would learn to arrange their time so as to take advantage of regularly planned periods for relaxation each hour, each day. Therefore, to be truly efficient in your study or other work you must learn to conserve all your available energy and powers. Few people can learn unaided how this may best be done. It is one of the chief problems of this book to show how one's energy and talents may be effectively conserved and most economically used.

3. CONSERVATION OF OUR SUPPLY OF TIME

Many students and most workers are no more wasteful of their energy than of their time, of which each has an equal amount — twenty-four hours a day. A student in one of the writer's classes reported that while looking up references in the library he had saved forty-five minutes in one day merely by determining the most economical method of performing this task. He had been looking up his references one at a time just before each article or book was needed. After making a brief analysis of the task of preparing his lessons that day, he adopted the following procedure for this particular phase of his work : He looked up all the needful references while at the card catalogue, placing the author's name and the shelf number of the book on the appropriate slips for the attendant. When two slips had been thus filled out, they were given to the

attendant, who secured the books while the student was getting the required information for the others. By this method the student not only saved forty-five minutes but was able to concentrate on his task much better when he began his study of the books to be read, because he had all his material before him while he worked and therefore could better judge of the relative value of the authorities and data consulted.

Another student reported that by actual experiment he found he had wasted an hour and a half in one day by worrying about the many things he had to do that week. This kept him from planning his work and taking up these tasks one at a time and turning promptly from one task to the next as soon as each one was completed.

4. THE RIGHT SELECTION OF OUR TASKS

But what is of even greater importance for personal efficiency than conserving one's energy and time or learning how to apply them effectively to one's tasks is learning to select only the things that are truly worth while or that will enable one to accomplish what he wants to do. That is to say, an efficient student or worker must have right purposes and plans. He must do only the things that will enable him to accomplish the things that he wants to do, and he must desire these things so intensely and so continually that he will never stop his efforts in their behalf until his goal is reached.

Some students and many men and women are like tugboats, tossed about on the waves, constantly darting hither and thither, emitting clouds of smoke, and making a terrific noise. They seem to be tremendously active. With them, there is "always something doing." But a tugboat never gets anywhere in particular. In spite of all its business and routine work, it ties up at the same dock every night.

Other individuals are like ocean liners: they proceed calmly, quietly, and with little show of effort. Ocean liners

move according to plans laid out months in advance. Their time is scheduled accurately and in detail. They proceed toward a definite port, irrespective of wind or wave. They make far less noise than a tugboat, but they run more rapidly and arrive at their destined port, having sailed every moment according to chart and compass, steering their course by the stars. They arrive at their destination because they keep constantly on the move and keep themselves always headed in the right direction.

The importance of having right ideals and plans, the necessity of holding these firmly and constantly in mind, and the factors which produce the desires or the will needed to carry them out will receive special attention in the early chapters of this book.

5. SCIENTIFIC ANALYSIS OF YOUR TASKS AND WORK

Every task which a student or worker is called upon to perform is more or less complex and comprises a number of steps for its performance. Even such simple tasks as looking up references in the library, laying brick, or washing dishes, when analyzed into the various steps that must be taken in their performance, show that much time and effort may be saved by making a careful study of just what a worker must do in the performance of such tasks. The task of "dishwashing" has, for example, been analyzed by Christine Frederick in her book *The New Housekeeping*, as follows :

1. Scraping waste from surface of china, agate, or other kind of dish or utensil.
2. Stacking or arranging dishes on surface adjacent to sink preparatory to washing.
3. Actual washing with water, soap, or other cleanser, with aid of cloth, mop, or other mechanical means.
4. Rinsing dishes with clear water.
5. Wiping dishes with towel or equivalent drying.
6. Laying away dishes on or in respective shelves and cupboards.

The efficiency of the whole process of "dishwashing" can therefore be improved only by finding the best order of doing these necessary things and by increasing the worker's efficiency in the performance of each of these separate tasks. The same is true for each thing that a student or worker is called upon to do. Only by making a careful analysis of the task itself may the best method for its performance be found. Certain things must in each case be done. These necessary things can best be done in a certain order, and the best method of performing each particular task can only be found by making a careful study of the task to be performed. This was done by Mr. Gulick for the boy who desired to win a certain swimming-under-water contest. Harrington Emerson says :

A few years ago Luther Gulick, director of physical education in New York City, was watching an athletic contest at a boys' preparatory school. One of the contests was swimming under the water. Mr. Gulick asked a boy whom he knew if he intended to enter the race. The boy answered that he could swim under the water all right, but that he did not intend to enter the race because he had not trained for the feat.

"Would you enter the race," asked Dr. Gulick, "if you were sure you could win?"

"Certainly," replied the boy.

"Well," said Dr. Gulick, "I can tell you how you can win this race."

The boy looked skeptical but waited respectfully for the plan.

"How long can you hold your breath?" asked Dr. Gulick, taking a stop watch from his pocket.

"I don't know," said the boy.

"Try it and find out," said Dr. Gulick. "Hold your breath just as long as you can while I time you." The boy filled up his lungs and held his breath manfully for fifty-six seconds. "You have held your breath four seconds less than a minute," Dr. Gulick told him, and asked if that was as long as he could hold it.

"Yes, sir," replied the boy.

"And yet there are people," said Dr. Gulick, "who hold their

breath from three to four minutes. A sea lion holds his breath under the water thirty-five minutes. Any normal boy of your age can hold his breath for two minutes without hurting himself. The secret is to breathe deeply and slowly many times, thus overoxygenating the blood; then, with the lungs full, to hold the breath. Now, I shall hold the watch again," said Gulick, "and give you the signal. See if you can hold your breath two minutes."

He held the watch, and the boy did as he was told. It was a hard struggle, but he managed to hold his breath two minutes on the test.

"You see," said Dr. Gulick, "you can hold your breath twice as long as you thought you could. Now, how many strokes do you take in a minute when you swim under the water? Make the motions in the air just as you make them in the water, while I count them."

He made sixteen strokes a minute.

"Now," said Gulick, "you know you can hold your breath for two minutes. By counting twenty-four strokes you will know when a minute and a half are up. Now go into this race, dive into the water, swim full twenty-four strokes, — it will not kill you, — and you will win the race."

The instructions were then carefully written out so that the boy could not possibly make any mistake in carrying out the plan they had made. An hour later he easily won the "swimming-under-water" contest because he had accurately determined his ability, had analyzed the task to be performed, and had acted in accordance with a definite plan of procedure based on the facts which this scientific analysis of the task revealed.

6. GENERAL IMPORTANCE OF LEARNING HOW TO WORK IN THE MOST EFFECTIVE WAY

The direct personal value of learning to do all our work in the most effective way is doubtless apparent to all. In the first place it makes it easier to do what must actually be done. This leaves more time and energy for doing the things which

we desire to do. If an individual can make the most of his available energy and talents and has learned how to conserve and use them in the most profitable way, he will be able to obtain more of the desirable things in life. It is learning to work in this scientific way that enables one to get what he desires, and so to become more serviceable to himself and to his fellow man.

Many studies have been made which show that a person who does well in his regular school work also does well in his business or profession. President Lowell made a study of all the graduates of Harvard College for a period of twelve years, and found that the men who had graduated with honors from the college succeeded to a marked degree in their professional work. His results are shown in the following table :

MEN GRADUATING WITH VARIOUS HONORS FROM COLLEGE	PERCENTAGE GRADUATING WITH DISTINC- TION FROM	
	(a) The Law School	(b) The Medical School
A.B.'s with highest honors	60	92
A.B.'s with great honor	40	87
A.B.'s with honor	22	76
A.B.'s without honor	6½	36

Of the 250 men who were graduated from the Harvard Law School from 1900 to 1915, all but one finished his law course with the same scholastic rating that he made in his college course.

Studies by Foster¹ show that college students make about the same degree of success in business and in the professions that they made in their college work. He made a careful study of the graduates of the class of 1894 at Harvard University, asking the dean of the college, the secretary of the alumni association, and a prominent member of the class to name the most successful men of the class. These judges were free to

¹ W. T. Foster, *The Administration of the College Curriculum*. Houghton Mifflin Company, 1911.

use their own interpretations of success but were not to include in their list the names of men whose success might be chiefly due to family wealth or position. After the judges had agreed on the twenty-three men who had attained the highest degree of success in life, Mr. Foster consulted their college records for the purpose of comparing their scholastic record with the record made by twenty-three other men chosen at random from the same class. He found that the twenty-three most successful men had made nearly four times as many A's in their college course as the twenty-three men chosen at random (196 A's as compared with 56). By a similar method three judges selected the most successful men graduating from the University of Oregon from 1878 to 1901. Of the graduates designated as successful 53 per cent had been *good* students and only 17 per cent weak students. Of the graduates designated as unsuccessful, only 12 per cent had been rated as good students, and 52 per cent had been weak students in their college work.

A study made of Wesleyan University graduates showed that of the living graduates for the period 1860 to 1889, 50 per cent of the men who were graduated with honors were listed in *Who's Who*, and only 10 per cent of the men who had been graduated without honors were to be found there. For the period 1890 to 1899, 60 per cent of the men who were graduated with highest honors were listed in *Who's Who*. Moreover, of the men elected to the honor society of Phi Beta Kappa for superior scholarship, 30 per cent were listed in *Who's Who*, whereas only 11 per cent of the graduates without superior-scholarship ratings were found.¹

A more exhaustive study of this same problem was made by E. G. Dexter, who found that 5.9 per cent of all the honor students in twenty-two colleges were listed in *Who's Who*, whereas only 2 per cent of all the graduates of these institutions

¹ F. W. Nicholson, "Success in College and in After Life," in *School and Society*, Vol. II (1915), pp. 229, 232.

had become successful enough in their chosen field of work to be listed there. He also found that 50 per cent of the Yale valedictorians were found in *Who's Who*, a fact which made their chances for being listed on this roll of the most successful more than twenty-five times as great as those of the other graduates. Mr. Dexter also studied the scholastic records of 13,704 living graduates from two New England colleges and found that 5.4 per cent of those whose college grades had placed them among the highest tenth for the entire college were listed in *Who's Who*, whereas only 1.8 per cent of the fourth tenth were found.

If the reader should think that *Who's Who* is not a good criterion for measuring success in life, he may have some of his doubts dispelled by the following tabulations made of the Oxford University men (England) who entered the law or the ministry and attained distinction in their respective professions :

SCHOLASTIC RATING OF OXFORD MEN ENTER- ING THE MINISTRY AND THE LAW	PERCENTAGE ATTAINING DISTINCTION	
	(a) In Law	(b) In the Ministry
Men with		
First-class honors	46	68
Second-class honors	33	37
Third-class honors	22	32
Fourth-class honors	20	29
Pass degree	16	21
No degree	15	9

As the figures show, the persons who do well with their work in school also do well with their work in after life. Since the correlation between scholastic attainment and success in life is so marked and holds for the early records as well as for the later, one is almost forced to conclude that some common factor has been operating throughout. It may well be inferred that the superior mental ability of these men and women, which enabled them to succeed to such a marked degree with their

college work, also enabled them to discover more efficient methods of work and so to succeed to an equally marked degree in their later work in life. Because they were more capable and bright, they were able to learn unaided how to work in the most effective way. This enabled them to make marked success both in their college work and in after life.

7. NEED FOR HELP IN LEARNING HOW TO WORK EFFECTIVELY

The brightest students and the men and women who have the best native endowments may, of course, learn how to work in an effective way unaided. A few with less native mental ability than the best may likewise acquire methods of work that are fairly efficient if their desire for this type of improvement is great enough or if necessity forces them to solve the problem for themselves. But most individuals will never be able to learn unaided how best to conserve their energy and time or how to use both in the most economical way when confronted by their tasks. They must have their personal interest awakened in the problem, be made to believe that they can improve their methods of work, and be directed or helped in such a way that better habits of work will be acquired.

A preliminary investigation made of the present habits of work of college students showed that only a few of the brightest students attending Indiana University in 1924-1925 were able without help to find the most economical way to do their work, but that all students could greatly improve their methods of work if made to believe that they could do so and if given the needed help. The investigation also showed that most high-school and college students never improve their methods of work much, if at all, either because they fail to realize that it can be done or because they are not interested in this type of improvement. The study also showed that the brightest students in our colleges and schools, those who might be able to acquire a truly scientific method of work without

specific direction, were aided more by special help given them in the "How to Study" course than was anyone else. Their greater capacity for learning, and the fact that they are spared much of the wasteful experimenting which finding the way for themselves would involve, make this possible.¹

The principles and laws that govern human efficiency in all kinds of work should therefore be clearly set forth, and the road pointed out which all must traverse to attain the most effective ways of performing their tasks.

8. SOURCE OF THE DATA AND MATERIALS USED IN THIS BOOK

The data that bear more or less directly on the solution of the problem which this type of learning presents have been accumulating for a number of years. For example, Professor Ostwald's interview with his distinguished Japanese student, referred to in the opening paragraphs of this chapter, made such a deep impression on the professor that he at once began to try to find an answer to the question which he had been asked. From the long list of university students whom he had had in his classes during the twenty-five years he had been professor he selected those who had achieved the most eminent success in their chosen fields of work. He next made a careful study of each of these men to try to ascertain the characteristics which they possessed that made them truly efficient and so eminently successful. The results of this study he put into a book entitled *Grosse Männer*, in which he attempts to tell why these particular men succeeded to such a marked degree.

About the same time Mr. Taylor, Harrington Emerson, and other efficiency engineers in this country began to investigate the problem of efficiency with a view to determining the laws which control it in every field. Mr. Emerson began by collect-

¹ Experience in the use of the materials contained in this book in "How to Study" courses at Indiana University, conducted for the past two years, has demonstrated the same thing.

ing examples of inefficiencies that had been corrected or removed. He and his assistants made clippings from newspapers and magazines, and from various technical and scientific periodicals of the United States and Europe. Twenty-five thousand illustrations from various fields of human activity were thus collected, collated, and classified by a competent specialist. At the same time Mr. Emerson was actively engaged in studying and remedying inefficiencies in manufacturing establishments and in business concerns throughout the country. He was trying to discover the laws which determine efficiency or inefficiency. When the twenty-five thousand examples of inefficiencies had been classified and the twenty-five thousand proposed remedies carefully tabulated and examined, Mr. Emerson found that the remedies for the inefficiencies naturally arranged themselves into a few classes or groups. That is to say, where real efficiency existed he always found clearly defined ideals, whereas many inefficiencies were produced by the failure to have such definite plans. He also found that in the efficient concerns these purposes were carried out promptly according to prearranged plans, that the conditions for work were carefully standardized or at least made favorable, that the tasks to be performed had been accurately analyzed to determine the best way of accomplishing them, and so on. These principles Mr. Emerson gathered together and described in his book *The Twelve Principles of Efficiency*, and recommends that they be followed in detail because, in his opinion, they constitute the laws that operate in producing the greatest effectiveness not only in business but in expenditure of human effort in every field of achievement.

About the same time that these men began to work at the problem of how greater efficiency might be attained in business and in one's own individual life and work, the writer became interested in the theoretical aspects of the problem from its psychological side and in its many practical aspects because of his personal interest in learning how to work more effectively

himself. He noticed that some students and professors could do much more work in a given time than others and could do it much more easily. He began to make a careful study of these men and women who were able to do this. He made a study of their methods of work, and he tried to get into close personal contact with the professors who had somehow learned to work in an effective way. He noticed how one of his best teachers, a man who had such poor health that he could work only a few hours each day, got much more work done, notwithstanding this physical handicap, than another teacher who worked much harder and who kept at it all the time. He noticed that the most productive and famous teacher he ever had could read a book of three hundred pages in an hour's time and that some students read a novel in about two hours and a half. He found after investigation that most students wasted much of their energy and time, that few of them planned their work or planned how to use their total available time, and that many more spent their energy and time doing things that were not worth doing at all.

Investigations in the field of learning showed that all students could learn how to work in a more effective way; that most of the mental functions involved in study and work, such as attention, memory, imagination, the feelings, one's powers of observation and will, could not only be conserved but also cultivated or trained. In his teaching of elementary psychology the author found that practically every student was helped by a knowledge of the laws which control human motives and conduct, that most students were intensely interested in every phase of the problem of personal efficiency, and that they earnestly desired to improve their methods of work.

Thus the writer came to look upon personal efficiency as an important problem in *learning*, as a definite task which some students learn to perform in an efficient manner for themselves but which others cannot perform without detailed direc-

tion and constant encouragement and help. He therefore sought to ascertain what actually had to be done to *learn how* to study or do other types of work in the most effective way.

His method was to go to those who had already succeeded in solving this problem for themselves and endeavor to ascertain from them how and why they succeeded. To this end many biographies and concrete examples were investigated. Indiana University organized two special courses entitled "Life Views of Great Men of Letters" and "Life Views of Great Men of Science." In these courses lectures on the life and work of the leaders in every field of science and art are given by the heads of departments and others, each man lecturing on his own special field. In these courses special attention is given not only to the contributions that these men have made in their respective fields but also to their methods of work. These methods were found to account in large measure for their marked success.

This was followed by a careful scientific analysis of this particular task — learning how to work in the most effective way — with a view to determining what a person must do to acquire the habits of work that make for the greatest personal efficiency in any field. The investigation was then carried one step farther, to determine how each of these necessary habits could best be formed.

The results of all these studies and the contributions made by the many investigators who have studied the problem in the past should, the author believes, be collected, collated, and presented for the use of all who are especially interested in the psychological or practical aspects of the problem of learning how to work in the most effective way.

The aim of this book is to delineate the path that must be followed in acquiring the ideals, the points of view, and the habits that constitute the skill of the most efficient workers. The general method followed throughout the book is (1) to provide helpful information about the principles and laws

that control personal efficiency in every field of work and (2) to give *actual practice* in the formation and fixing of the particular habits that must be established to attain this result. The real problem of the book is to show how greater personal efficiency may be acquired by developing the particular sets of habits that constitute the skill of the most successful workers in every field of human achievement.

EXERCISES AND QUESTIONS ON THE TEXT

1. Need for personal efficiency in study and work.

a. List, using concise and clear statements, all the reasons you can think of why you, as an individual, should try to improve your methods of study or work.

b. When you have given every reason you can find for trying to learn how to work in the most effective way, rearrange your points in the form of a sort of sales talk, directed to yourself and formulated in such a way as to convince yourself that you ought to improve in this type of learning.

2. Next enumerate all the things that you have done in the past in trying to make yourself more efficient in your work.

3. Think of all your schoolmates and the other students you have known rather intimately, or, if you are a worker in some other field, think of the workers in your particular field. Then select the three persons who are most efficient and the three who are most inefficient in their work. Place the names of the most efficient individuals, those most nearly like Mr. Y, at the top of a sheet of paper on the left-hand side, and those who are most inefficient, or more nearly like Mr. X, on the opposite corner. Enumerate under each group of names, in a 1, 2, 3 order, the particular traits which made you place these particular individuals among the most efficient or the most inefficient group.

After you have exhausted your supply of descriptive phrases for the individual's belonging to each of these groups, re-read the account in this chapter of the way Mr. X and Mr. Y did their work, jotting down as you read any additional traits that made these particular individuals either efficient or inefficient in their work.

4. Name and illustrate the four chief ways in which human energy may be conserved and greater personal efficiency attained.

5. Which of the four methods illustrated in this chapter will in your judgment yield the best results?

6. How and where were the most helpful facts for this type of learning obtained?

7. Why are most persons unable to learn how to study or work in the most effective way without some expert direction or outside help?

8. Why should there be such a close relationship between an individual's success in school and his success in later life? What does this fact suggest about the importance of learning to do your work as a student in a more effective way?

REFERENCES

- ADAMS, J. Making the Most of One's Mind. George H. Doran Company, New York, 1915.
- BENNETT, ARNOLD. Mental Efficiency. George H. Doran Company, New York, 1911.
- FOSTER, W. T. The Administration of the College Curriculum. Houghton Mifflin Company, Boston, 1911.
- GULICK, LUTHER H. The Efficient Life. Doubleday, Page & Company, New York, 1909.
- KING, HENRY CHURCHILL. Rational Living. The Macmillan Company, New York, 1906.
- PURINTON, EDWARD EARLE. Efficient Living. Robert M. McBride & Co., New York, 1917.

CHAPTER II

ANALYSIS OF THE TASK OF LEARNING HOW TO STUDY AND WORK EFFECTIVELY

From what has already been said it should be clear that acquiring effective methods of work represents an important type of learning in which few students can succeed unless they are given special direction and help. Even the most gifted persons rarely discover for themselves the best ways of doing the things that must be done to succeed in this type of learning. And if students do develop for themselves an effective method of work with such aid as they may be able to get from their teachers and by observing those who have already succeeded in learning to work in an effective way, it is usually *after* the need for such methods of study has passed, because most of their work as students has already been done. A careful study made of the present method of work of some fifteen hundred college students revealed the fact that most of these students never analyzed their tasks in order to find a better way of performing them. Some were not even interested in improving their methods of work. Many did not know that improvement in this direction is possible. There is special need, therefore, for pointing out the possibilities for improvement in this direction and for charting the road which all learners must traverse if they are to learn to work in the most effective way.

1. ELEMENTS OF AN EFFICIENT LIFE

The value of a life and the effectiveness of a man's work depend (1) on the character of his ideals or purposes and plans; (2) on the intensity of his desire for realization of these

or on the strength and persistence of his determination to carry them out; (3) on the amount of energy and health at his disposal for their realization; and (4) on the kind and amount of knowledge and skill which he has acquired to aid him in finding the best ways of obtaining them.

In our study of the laws that determine personal efficiency in all study and other work we shall therefore have much to say about the importance of ideals; about the function of definite purposes and plans in the work of a student; about the part which determination or persistence plays in the realization of these aims; about the need for specific knowledge *of*, and actual practice *in*, the best methods of applying one's energy to his tasks; and about the residuum of energy at a person's disposal, which, together with his habits and skills, enables him to carry out his purposes and plans. But we should begin our study on the problem of learning to work in the most effective way by making a tentative analysis of this type of learning to ascertain just what everyone must do while learning to work in the most effective way. For it is more difficult for a student to find the best ways of doing these necessary things if he does not have a clear idea of just what he must do to succeed in this type of learning.

2. THE TRUE BASIS FOR EFFICIENCY IN STUDY AND WORK

Everyone who desires to learn to work in the most effective manner should try to develop in himself the following characteristics: (1) He should learn to conserve not only his energy and health but also his total available time. (2) He should learn to use his time and all his mental and physical powers in doing the *particular* things that he desires to do. (3) He should learn to acquire and be led by right ideals, for these determine the direction in which his energies will be applied. To be truly efficient, all one's energy must be directed in the proper channels or be expended on desirable and worth-

while things. Nothing counts in the performance of a task unless one's energies and time are applied in doing the particular things which must be done to get him where he wants to go. (4) Each worker and student should also acquire the ability to desire these necessary things so strongly and persistently that his efforts in their behalf will never cease until the means for their realization are found. (5) Lastly, the student should learn to work in a scientific way at all his tasks, for in no other way can his energy be effectively applied in the performance of these tasks.

3. GENERAL ANALYSIS OF THE TASK OF LEARNING TO WORK EFFECTIVELY

A complete scientific analysis of the task of learning how to work in the most effective way would reveal just what each learner must do to succeed in this type of learning :

1. He must learn to schedule his time and tasks so that he will be able to conserve both his energy and his time.

2. He must learn to dispatch his work as planned or learn to do it according to his definitely formulated plan.

3. He must learn to standardize the conditions under which he works in order to make them favorable for his work.

4. He must learn to make an analysis of each task and of his work taken as a whole that he may find the best way of doing all the things that he desires to do.

5. He must learn to make definite instructions for carrying out his plans of the use of his energy and time in the performance of his tasks. Such plans should be made for each task and for long periods of time, such as for one's college course or for one's life as a whole. They should be carefully written out that they may serve as a sort of architect's specifications and plan for what he proposes to do.

6. He must also learn to develop a certain mental attitude toward his tasks and work. That is to say, he must be honest

and truthful with himself and acquire a scientific point of view in regard to each task and his work taken as a whole.

7. He must also learn to select accurately and promptly the things that fit in with his purposes and plans and to reject those that are foreign to his present problem or to his immediate or ultimate plans, and be able to judge accurately of the relative worth of each. Most workers fail just here. They do not realize that the best help comes from determining clearly one's exact purpose in every case. Judgment is, of course, a native ability ; but it may be cultivated if we know how, and seeing the exact problem to be solved is one of the necessary means for its improvement.

8. A learner in this type of acquisition must also learn to know where to get reliable counsel and help for making further advancement in this direction. He should know what the reliable authorities are and where to get the needed help, how to distinguish between those who know and those who just think they know, and how to form the habit of going for his information and help to reliable sources instead of relying on himself or on those who merely think they know.

9. Every successful student must also learn to do a number of specific types of work ; for example :

a. Preparing an assignment in a text.

b. Investigating a special problem or subject assigned for special investigation.

c. Learning or memorizing data ; that is, fixing certain things permanently in mind for future recall and for effective use.

d. Solving new problems or learning to meet new situations and difficulties successfully.

e. Concentrating his efforts fully and continually upon each task that he attempts to perform.

f. Making oneself more original, ingenious, and adaptable.

10. Lastly, every student or worker must be able to measure the progress which he is making in each important source of advancement in order that he may be stimulated by this

knowledge of his personal success and be aided in selecting the things that he must do to succeed.

The real problem of this book is to point out as clearly as possible how these and other necessary problems confronting a learner in this field may best be solved, and how the difficulties encountered in doing each of these things may be avoided or best overcome by those who desire to improve their methods of work.

4. HOW PROGRESS IN THIS TYPE OF LEARNING IS MADE

Help in learning to do each of these necessary things may be obtained in two chief ways: (1) by learning the laws that control human behavior in all learning and work; (2) by acquiring the ability to put this knowledge to actual use in the performance of all one's tasks.

It is, for example, helpful to obtain information about the sources of human energy — how it is conserved, released, restored, and directed toward specific ends; to understand the principles that determine one's ability to control and direct his mental energy and powers; to know how habits are actually acquired and fixed and how one's desires, interests, and purposes are acquired and strengthened. But real efficiency in learning how to work can only be acquired by establishing the habits that constitute the ability to do one's work in the most effective way. Each learner in this type of acquisition must somehow get enough practice in putting this knowledge into use in solving his daily problems to develop the habit of doing all his work in the most effective ways. That is to say, human efficiency in study or other work does not consist in a knowledge *about* certain methods of work: it comes from the development and use of certain habits of action, from the functioning of particular habits of thought and work that enable their possessor to make such a type of response as serves effectively for his tasks.

Learning how to work, therefore, is at bottom a matter of acquiring specific habits ; these must be established before any real progress in this type of learning can be made. No amount of knowledge will suffice, nor will mere wishing produce the desired results. A scientific attitude must be adopted and a particular method used for all tasks. Without a strong determination to *apply* what has been learned about the laws that control personal efficiency in learning and work there can be no real progress in this study.

Throughout the book we shall therefore attempt to present such information as will show just what must be done to learn to work effectively, also to give concrete help on how each of the necessary things may best be done. But the chief emphasis should and will be placed on giving actual practice in *doing each of these things* so that the habits which constitute the skill desired shall be firmly established.

To this end each chapter will contain both a theoretical section and a practical section. The theoretical division will indicate the road over which a student must travel to make himself efficient, and it will also give some help on how each necessary thing may best be done. The experiments will give actual practice in things that must be done to establish the habits that must be formed in achieving the desired results. They should therefore not be slighted or taken lightly, but made a regular part of your study, because some such practice is needed to establish the habits that you seek to form and that make up the efficiency you seek. It should be remembered that all information given is merely a means to an end, whereas the experiments and practical exercises are the *only true means* for making the desired improvement in this type of learning. Each student should religiously perform all the experiments given, should carry out every suggestion made in the experiments, and should keep an accurate record of his progress in each of these sources of improvement as far as this may be done.

5. HOW PROGRESS IN THIS TYPE OF LEARNING IS MEASURED

One of the greatest aids to progress in any instance of learning is for the learner to see clearly just what he must do to succeed. He should also have a practical and reliable way of measuring the progress which he is making in each of the necessary sources of advancement. Such quantitative results not only enable a learner to know how he stands in regard to each of these sources, but they also aid him in finding the best means for doing these things by eliminating the wrong responses made in the process of originating the correct ones, and by selecting and fixing the more economical responses that he originates. Such measurements also enable him to become more interested in the progress he is making, and so serve as an incentive to still greater endeavor for reasons which the writer has elsewhere described.¹

From the brief analysis of the task of learning to study given above, it should be clear that progress in this type of learning cannot be measured as a whole. The gains in each important source of improvement must be as accurately determined as possible and be quantitatively expressed. For some of these sources of improvement no quantitative measurements can as yet be made, since no standards for measurement have been devised and no way has been found either to measure progress in these sources of gain or to establish reliable norms whereby the results of such measurements may be interpreted.

It is, indeed, very difficult to get reliable standards for measuring progress in this type of learning. In many cases the standards that must be used, like those for measuring other human abilities and powers, are tentative in character. Sometimes they are changeable and variable. And no standards in

¹ Compare W. F. Book and Lee Norvelle, "The Will to Learn," in *Pedagogical Seminary* (December, 1922), pp. 305-362; also W. F. Book's *Learning to Type-write* (The Gregg Publishing Company, 1925), chap. xx.

the field are perfect or fixed, like our measures for time, for distance, for the pull of gravity, or for measuring the intensity of light.

Therefore, in our measurements of human efficiency and in measuring the progress which is made in learning how to work in the most effective way, we must not only devise new methods of measurement but also establish our standards, or norms, by actual experimentation. Many standards are established by authority; for example, we get our standard time from Washington. In fact, most of the norms for our measurements in the physical world are established by the Bureau of Standards at Washington. But the standards for work and for human performances of every sort can only be established by experiment, as is done when railroad officials run a train over a certain route many times to determine what a reasonable schedule for running a train over this route would be; or as is done when one times himself on several occasions to see how much time should be allowed to go from his home to the railroad station to catch a train, or to go from his room to school for his first class in the morning.

In all fields of human activity a standard achievement is that amount which has been established by experiment or actual trial as a reasonably attainable maximum performance in that particular type of work.

One of the causes that make measurement difficult in the field of human achievement is the fact that it is often difficult to devise proper methods for measuring the particular things which we desire to measure. The methods and technics for measuring the progress that is made in learning how to study or work in a more effective way, as well as the norms, or standards, that must be used, will therefore be presented and explained in connection with the various experiments which have been devised to measure the gains made in this type of learning. We shall begin by giving you a chance to determine how effective you are in using your total supply of time.

6. MEASURING YOUR ABILITY TO USE ALL YOUR
AVAILABLE TIME

There are three ways in which any student or worker may be inefficient in regard to the use he makes of his time: (1) He may waste a certain amount of time each day. (2) He may be very inefficient in his ability to *use* this time effectively in doing the specific things which he has planned to do or which necessity requires him to do. That is to say, he may work all the time, but be very ineffective in his work, like Mr. X in the story related in Chapter I. (3) He may, on the other hand, be very efficient in conserving his time and in using it to do the things that he has planned to do, but be inefficient as a worker because he does the wrong things. Such a person would be inefficient because he has not learned how to select the right things to do. He uses all the time he has. He can also use this time effectively in carrying out his purposes and plans, but he has not learned how to select the things that enable him to accomplish what he desires.

Our first experiment will enable you to determine how effective you are in using your total supply of time, twenty-four hours each day. It seeks to determine how much time you waste each day, and how or why this important element in personal efficiency is lost. But the most significant part of the experiment is not to determine how much time is actually lost each day or week, but to ascertain *how* it is wasted, so that the necessary steps may at once be taken to eliminate this source of waste.

Time is the one thing of which each student or worker has an equal supply. "It is the only commodity that slips away in a steady stream, regardless of what you do with it. It cannot be halted in its flight, nor coaxed or forced to return. A billion-dollar corporation, with all its wealth and credits, cannot buy back one second of yesterday's time. What you do with today's supply of time, therefore, becomes a fixed, unchange-

able, and unchanging fact." Harrington Emerson has said that the only difference between a world master like Edison and an aged pauper is the difference in the use which each has made of his hundred and sixty-eight hours of available time each week.

However this may be, it is important to know how successful you are in using your total available time, how much of this time you actually waste, how this time is lost, and so on. One of the most important problems in learning how to work effectively is to determine how efficient you are in the use you make of your available time.

A careful study made of the methods of work of a thousand freshmen entering Indiana University in 1924 and about four hundred upper classmen revealed the astounding fact that the freshmen wasted, on the average, about four hours of time each day and the junior and senior students more than two hours each day. It is important, therefore, to determine by actual measurement how you as an individual stand in regard to this element in personal efficiency. To do this you should perform very carefully Experiment I and keep your results for future reference as directed in the experiment.

EXPERIMENT I

Problem. To determine your efficiency in handling your total supply of time.

Method. Keep an accurate record by the method given here of how you spend all your time for a week. Begin at 6 o'clock in the morning and continue the experiment for a week.

Record in a small notebook¹ or on such a schedule blank as is given in Form III, p. 38, everything that you do during the day and the amount of time actually devoted to it. Every five-minute period of the day should be accurately accounted for. If you should allow eight hours for sleep, one hour in the morning for

¹ In consultation with your instructor you may devise a schedule blank on which to record the way you actually spend your total available time.

bathing and dressing, three hours for meals, you would still have twelve hours for recreation and for study or productive work. It is of these twelve hours that you should keep the most accurate record. You may sleep more or less than eight hours. You may spend more or less than one hour for your toilet and three hours for your meals. Keep a faithful and accurate record of how you spend your total time each day for a week. Each night determine, by consulting your notebook or record sheet, how much time you have devoted (1) to sleep, (2) to your toilet, (3) to meals, (4) to recreation, (5) to study or other important work, and (6) how much time you have wasted. Record these amounts each day in the proper spaces in Form I, p. 36.

In securing this information it is easier, perhaps, to keep a chronological account of everything you do during the day, stopping at convenient intervals to jot down in your notebook or on the schedule card shown in Form III how you spent the time that has elapsed since your last record was made.

Each night you should copy from your notes or schedule blank the data called for in Form I and record it in the proper columns or spaces in Forms I and II, pp. 36, 37. Be particularly conscientious and painstaking in recording the cause of the time you wasted.

Time profitably employed includes, besides the time devoted to study or other forms of work, a reasonable amount spent in sleeping, eating, bathing, dressing, exercise, recreation, relaxation, and so on. *You* are to be the judge as to how much time you should allow for each of these items. Be particularly careful to determine each day how you spend the twelve hours mentioned above.

Results. The chief value of Experiment I lies in the fact that it will show you how you actually spend *all your time* for one week. It will show you how much of your total time is used in a profitable way each day and how much is wasted. What is still more significant is that it will show you in *what ways you are wasting your time* or the things that cause you to lose this time each day. The analysis of the *causes* of this waste, called for in Form II, is therefore very important and should be carefully made each day as an *essential* part of the experiment.

Your efficiency in handling your total supply of time may be

calculated on a percentage basis by dividing the actual number of hours and fraction of hours during which you were profitably employed, as shown in Form I, by the standard number of hours in each day (24) or week (168). Determine your percentage of efficiency in ability to use your total *supply* of time each day and for the week as a whole by dividing the total number of hours you spent in profitable employment each day or for the week by your standard, the total number of hours available. The exact causes of the waste, listed on Form II, should be carefully studied so that this source of inefficiency may be promptly eliminated.

The following questions naturally arise in connection with Experiment I and should be answered after you have determined all the facts and studied your results:

1. How effective am I in the use of my time? That is, how much of my time is profitably spent and how much is unaccounted for or wasted?
2. What are the chief sources of this waste? If you are wasting any time, you cannot eliminate this source of inefficiency until you know when, where, and how you are losing it.
3. How may these sources of waste be eliminated?
4. What specific reasons do I have for utilizing *all* my available time?
5. What should I plan to do with the time I have been able to save by performing Experiment I and by locating definitely the causes for this loss of time?

Before taking up another experiment you should plan to do two things in connection with your sources of waste: (1) Establish the habit of using *all your available time* in a profitable manner, including the time you have learned to save by performing Experiment I. (2) Give particular attention to the elimination of this waste until the habit of conserving your available time has been established. This can best be done by giving special and continued attention to this particular point until the new habit has been thoroughly fixed. In six weeks or two months the experiment may be repeated to determine any improvements that may have been made.

Keep an accurate and permanent record of your results in this experiment and remember that it is valuable only as an aid in establishing a desirable habit which you have not yet formed.

FORM III

WEEKLY WORKING SCHEDULE OF

DATE

HOURS	SUN.	MON.	TUES.	WED.	THURS.	FRI.	SAT.
<i>Morning</i>							
6-7 . . .							
7-8 . . .							
8-9 . . .							
9-10 . . .							
10-11 . . .							
12-1 . . .							
<i>Afternoon</i>							
1-2 . . .							
2-3 . . .							
3-4 . . .							
4-5 . . .							
5-6 . . .							
6-7 . . .							
7-8 . . .							
8-9 . . .							
9-10 . . .							
<i>Night</i>							
10-11 . . .							
11-12 . . .							
12-1 . . .							
1-2 . . .							
2-3 . . .							
3-4 . . .							
4-5 . . .							
5-6 . . .							

EXERCISES AND QUESTIONS ON TEXT

1. State *concisely* your purpose in taking this course, indicating what you would like to get from it.
2. Name and briefly explain the elements of an efficient life.
3. State in your own words what a person must do to learn how to work in the most effective way (compare sections 2 and 3).
4. Explain the importance of accurate knowledge and training in doing effective work.
5. To make yourself personally efficient what is needed in addition to well-organized knowledge? Why?
6. How must progress in personal efficiency be measured? Why is measurement desirable or necessary in this field?
7. What is meant by a standard? Explain the general value and uses of standards.
8. Give examples of (1) permanent or fixed standards, (2) a changing or variable standard, (3) a perfect standard, (4) an imperfect or tentative standard.
9. Define a standard for personal efficiency or for human achievement. Illustrate. Why do we need standards for measuring human capacities and achievement?
10. Discuss briefly the importance of learning to *conserve* your total supply of time.
11. Perform Experiment I, writing up your results in the best way you can so they will be clear to *any* reader. Keep a permanent record of your results for future use as indicated in Forms I and II at the close of this chapter.

REFERENCES

- BENNETT, Enoch Arnold. *How to Live on Twenty-Four Hours a Day*. George H. Doran Company, New York, 1910.
- EMERSON, Harrington. *Twelve Principles of Efficiency*. Engineering Magazine Company, New York, 1917.
- GILBERTH, Frank B. *Bricklaying System*. M. C. Clarke Publishing Company, New York, 1909.
- TAYLOR, F. W. *The Principles of Scientific Management*. Harper & Brothers, New York, 1919.

PART II

PHYSIOLOGICAL AND PSYCHOLOGICAL BASIS FOR PERSONAL EFFICIENCY IN STUDY AND WORK

CHAPTER III

CONSERVATION OF THE ENERGY USED IN STUDY AND WORK

1. SOURCE AND MEASUREMENT OF HUMAN ENERGY

As stated in the preceding chapter, the value and efficiency of a life depend on the character and strength of one's ideals or definite purposes and plans; on the intensity and constancy of his desire for their realization; on the kind and amount of knowledge and skill which one has acquired to aid him in finding the best means for attaining these desirable things; and on the amount of energy at his disposal for doing the things that must be done to obtain what he plans for and desires. It is easy to see, therefore, that the amount of energy which one has at his disposal for attaining the most desirable things in life and the care one takes in its conservation and proper use are peculiarly basic for personal efficiency in every field of work.

Studies of the biographies of the most successful men and women in various fields of human activity have shown that they all paid particular attention to the conservation of their energy and health. In fact, everyone knows that the conduct and efficiency of a man are determined not merely by his ideals and the strength of his desires but by the residuum of energy which he possesses and can use in the realization of these purposes and plans; for without this necessary reserve of mental and physical power his desires and purposes, no matter how lofty and strong, would be largely, if not entirely, useless to him, since he would lack

the ability to use this knowledge and skill in the realization of these purposes and plans.

Therefore, for personal efficiency in all study and other work three things are absolutely essential : (1) There must be a residuum of human energy over and above that which is needed to meet one's ordinary bodily wants. All the intellectual and moral activities which have come to be the great factors in mental and social evolution, and which serve as the directing forces in human evolution and personal life, are dependent upon the amount of available energy over and above that which is needed for mere living. Therefore, in an efficient life this residuum of energy is carefully conserved. But (2) it must also be released at the proper time, and (3) it must be rightly directed or effectively used if personal efficiency in one's study or other work is to be attained.

(1) *Measuring the Amount of Energy available for Study or Work*

We can tell with precision just what a machine is able to do, because we have the norms and standards for measuring its power and endurance. It is difficult, however, to measure the capabilities and the endurance of the human machine, because we do not have suitable standards of measurement in this field or reliable norms with which to make our comparisons. It is, for example, impossible at the outset of life to tell what an individual will be able to do, for he is a mere bundle of possibilities unknown to himself or to his friends, except as they might be indicated by his heredity or by his potential energy or mental and physical powers. It is more difficult still to determine a person's endurance or capacity for work. We have no standards that are entirely reliable for determining his capacity for mental and physical activity of any sort. Tentative standards and methods for determining the general level of mental ability have been devised and

standardized by psychologists,¹ who have also devised methods of measurement that are reasonably reliable for determining a person's susceptibility to fatigue and his ability to recover from the effects of continuous work in any field.

If a single muscle is stimulated continuously for a time by applying an electric shock of moderate intensity, one about every two seconds, we get a measure of the muscle's ability to react, which is pictured in Fig. 1. The response grows



FIG. 1. Fatigue curve of a muscle (Woodworth)

stronger for a time because the muscle becomes "warmed up," as it were, through the exercise. This gain in strength is probably due to the increased supply of blood which the exercise has brought to the muscle and also, perhaps, to the temporary stimulating effect of the waste products produced by the movements so elicited. But if the stimulation is continued, there is soon noticed a rather sharp falling off in ability to move the muscle caused by the waste products produced by its own activity and by the consumption of the energy stored in the nerve cells that move the muscle. The contraction of every muscle depends on the oxidation of the fuel supplied by food and air. This produces oxidized wastes, of which carbon dioxide is the best known. These waste products, being produced by the continued activity faster than the blood

¹ Lewis M. Terman, *Intelligence of School Children*. Houghton Mifflin Company, Boston, 1919. See also W. F. Book, *The Intelligence of High School Seniors*. The Macmillan Company, New York, 1922.

can carry them away, accumulate in the muscle and produce an organic state called fatigue. In this case the fatigue is an inner state of the muscle that persists until the blood carries the waste products away and predisposes the muscle toward a weakened response.

In ordinary human experience and in all work and enjoyment the stimulus for moving the muscles and for causing the activity of the higher brain cells that are active in thought comes from a nerve impulse which originates in the nerve cells. These cells act as regular little batteries in originating the motor impulses, which move the muscles. Other nerve cells are active when a sense organ or sensory area in the brain is stimulated in the regular way and give rise to sensations, feelings, perceptions, thoughts, and the like.

(2) Real Source of the Energy used in Study and Work

That the real source, or seat, of the energy of the body lies in the cell bodies of the nervous system was demonstrated by the early experiments of C. F. Hodge. He selected a brood of young barn swallows that were just able to fly and as nearly alike as possible. He killed one of these swallows early in the morning after it had had a night's rest and before it had had time to exercise or become fatigued. He made a large number of sections through certain areas of its brain and obtained an exact photographic drawing of different types of nerve cells in its brain and spinal cord showing the physiological and anatomical condition of these cells when fully rested or restored to their normal condition by a night's rest.

Other swallows from the same brood were caught at night after they had been flying about in search of food all day and after the usual activities of a day. Cross sections were made through the same areas in the brain and spinal cord of these fatigued birds that were used in making the preparations for the rested one. The nerve cells of the birds killed at night

showed a marked deterioration of the cells, or an actual shriveling up of the cells and a decrease in size of about 50 per cent, also a marked change in the shape of the cells and in the

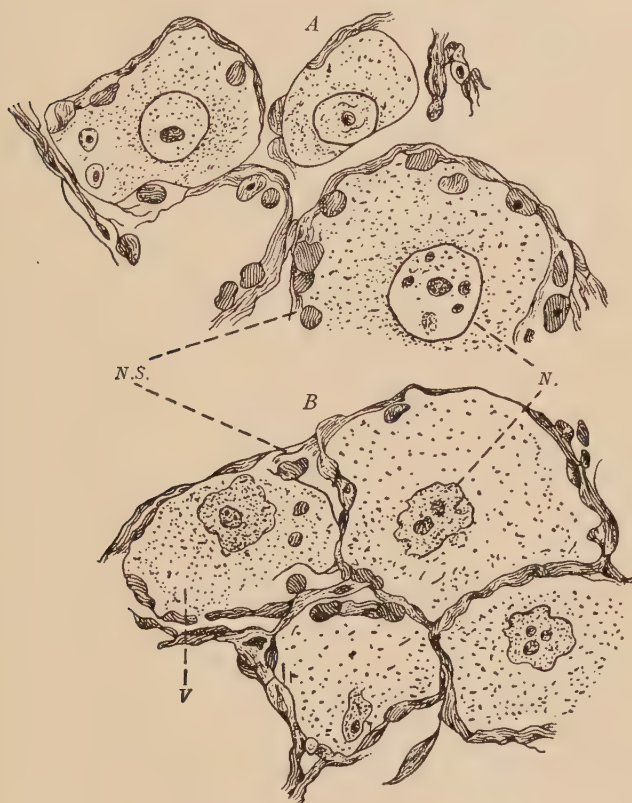


FIG. 2. Evidences of fatigue in the nerve cell (Hodge)

A, fresh nerve cells; *B*, corresponding cells when fatigued; *N*, nucleus of a fatigued cell and of a rested cell compared

shape of their nuclei. The cells from the rested bird killed in the morning were, on the other hand, plump and round and showed none of these deformities and signs of degeneration.

Other physiological conditions were also revealed by the experiment, some of which may be noted from the drawings shown in Fig. 2, p. 47.

Similar experiments were made on bees which Professor Hodge carefully marked, killing some of the marked bees in the morning before any work had been done, and others at night after scores of trips had been made in search of honey. His findings in these experiments verified his results with the swallows, proving that the substance of the nerve cells is actually used up by enjoyment and work of every sort. In fact, the work done by Hodge's swallows and bees caused their nerve cells to decrease in size about 50 per cent.

Other experiments just as conclusive and interesting as those conducted by Hodge have demonstrated that the fibrous part of the nerve cells is not much affected by the activity of the cells or by the conduction of nerve impulses sent over these processes to adjoining cells. That the fatigue is centered mainly in the nerve cell rather than in the poisonous effects produced by the activity of the muscle or in the conducting part of the cell is suggested by the results of the following experiments.

· A nerve-muscle preparation which had been normally stimulated through the nerve cell up to the point where total exhaustion had taken place was stimulated electrically. This caused the muscle to move as if no fatigue had occurred. After the cell had had time to recuperate by the rest obtained during the period of this mechanical stimulation, the muscles could again be moved in the normal way by the action of the rested cell, showing that the real loss of power is in the energy-producing cells which originate the nerve impulses that move the muscles or that produce enjoyment and thought.

(3) *Measuring an Individual's Susceptibility to Fatigue*

A person's susceptibility to such fatigue has been measured in four different ways, none of which, however, show conclusively his power to continue the work. It has been measured (1) by his ability to continue the task or by the amount and quality of work that he can do in a specified time, (2) by the feeling of discomfort or state of consciousness which he experiences *after* and *during* continuous mental or physical work, (3) by changes in the sensitivity of his sense organs to certain stimuli, and (4) by the degree of variability in a particular type of performance.

A typical experiment to determine what a person can do is the following: Boys of the same age, size, education, and training were given single columns of figures to add, and their ability to continue this work was accurately and carefully measured. Where such experiments have been conducted, the results show that some persons exhibit signs of fatigue almost from the first and are soon exhausted. Others seem to increase in acuteness and in ability for a time and then to fall off very gradually. If other tests are given to determine how long it takes these same persons to recover from the fatigued condition induced by the work, it is found that marked and important individual differences are found not only in the susceptibility which different persons show to fatigue but also in their power to recover from fatigue by set periods for relaxation and rest.

By such experimentation the following types have been distinguished:

Those who become fatigued very easily and recover quickly.



Those who become fatigued more slowly and recover quickly.



Those who become fatigued quickly and recover slowly.



Lastly, a type that fatigues very slowly and requires a long period of rest to recuperate when really fatigued.



Many persons occupy positions between these various extremes.

(4) *Total Supply of Energy Limited*

Such experiments have shown not only that the amount of energy possessed varies for different individuals, but that the total supply of energy for a given individual is definitely limited and that the energy which he can apply to his tasks depends (1) on how much he possessed in the first place, (2) on how well he conserves and uses the energy actually possessed, and (3) on his ability to create a new supply of energy when it has been used up by enjoyment and work.

The body generates normally each day about 3400 foot-pounds of energy through the digestion of food and through the extraction of oxygen from the air that we breathe. Of this total supply about 2840 pounds are used each day in maintaining the heat of the body. This leaves only 560 pounds for carrying on the vital, mental, and muscular processes which make up our daily life. It is evident, therefore, that our capacity for activity and work is limited, that each of us has a different and definitely limited human bank account in the form of the available energy at our disposal, and that efficiency in our work depends at bottom on what we do with this energy or human power. All depends upon how this small surplus of human energy is conserved and upon how it is used in doing our work or in doing the things that we desire to do.

(5) *Significance of the Small Residuum of Human Energy at the Individual's Disposal*

One of the most remarkable achievements in human evolution is the creation and maintenance of this small margin of surplus energy. It serves as the driving power for all that we do. It is the basis for all our ideals or purposes and plans, for our loftiest desires, for all our moral and religious aspirations, which serve as the directive forces in human life. These have their roots and origin in the small residuum of energy at our disposal over and above the amount needed to maintain the heat and life of the organism. The ability to realize some or all of our desires depends, therefore, upon how well we have learned to conserve, utilize, and restore this surplus store of available energy which we need in doing our work.

(6) *How Human Energy is Normally Released*

a. Why human energy is consumed. Every activity of the organism consumes vital energy and is therefore a draft on our supply of available power. Any enjoyment or work, no matter of what kind, is a draft upon the limited supply of energy at our disposal for such enjoyment and work. Every stimulation, every thought or appeal to the senses, the things attended to and those not directly attended to, draw on the same vital bank account. The circulation of the blood, the digestion of food, the tense condition of the muscles in attention and thought,—mental and physical work of every kind,—use energy. The most expensive drafts on our store of energy are made by emotion. Anger and fear exhaust our supply of energy very quickly. In the World War the terrible thought of war and the constant fear of death caused a complete collapse of scores of soldiers, sometimes even before they left this country for the battlefields of France.

b. The normal curve of work. Curves showing capacity for

work for extended periods of time have been drawn for many types of human activity. They show that very definite and constant changes take place in the speed and accuracy of the worker's performance and usually also in the amount of effort that must be expended to keep the output near the level of his best performance. When any performance is continued for a long period of time, there is a rather marked falling off in general efficiency. The amount of decline that takes place in

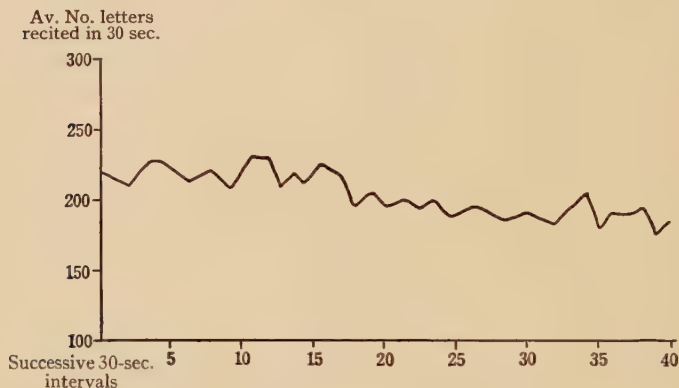


FIG. 3. Twenty-minute work-curve for reciting the alphabet backward
Curve represents composite of four performances for one subject
(After Robinson)

these work-curves depends on the kind of work done, on the individual's power to resist fatigue, and somewhat on the criterion of efficiency used in the measurements taken. A typical work-curve is that shown in Fig. 3, picturing the rapid decline in ability to recite the alphabet backward after this task has been worked at for several minutes.

The general drop in these work-curves usually develops gradually, but there often occurs an abrupt inability to continue the performance. Painter, after a busy day and evening spent at work of an intellectual sort, began at 11 P.M. to perform four-place by four-place mental multiplications. After

working at a maximal speed until shortly after 3 A.M., he suddenly became unable to continue. Trying simpler arithmetical calculations, he found that he was as incapable of doing these as the harder problems. He concludes that there exists a definite point, relatively abrupt in its appearance, beyond which mental work becomes impossible.

Such periods of total inability to do mental work were minutely described by G. T. Patrick and his subjects after keeping themselves awake for seventy-two or ninety consecutive hours. They experimented with various psychological tests and types of work, and found that after a certain amount of physical and mental work the store of available energy becomes so depleted, and the unpleasant sensations which normally accompany this physiological state are so strong and disturbing, that it takes unusual stimulation and special incentives and effort to be able to continue work at all, and that after a time no amount of stimulation will suffice to elicit the desired response.

(7) *Effects of Overwork*

When a healthy organism begins to become exhausted; a general *feeling* of fatigue sets in, which serves as a warning to the worker because it is nature's method of recording the general state of the individual's store of energy or capacity for work. But the mere *feeling* of fatigue is not a reliable index of the exact state of his energy and health, as will presently be shown.

Under ordinary circumstances when we feel fatigued we stop work and rest, because the feeling of fatigue is nature's warning to stop and, if properly guarded, is a fairly safe signal to follow. Sometimes, however, we do not stop work when we feel fatigued. Then we experience what has been technically termed a "second wind" and "third wind." That is to say, we experience a period of work characterized by great mental

clarity and freedom from the feeling of fatigue, accompanied by the ability to do much more and better work than we were doing before the feeling of fatigue set in. The phenomenon is well known and may be observed in many athletic games and in various racing events. Here the ability to release the reserved stores of energy, which it is believed are being tapped under such circumstances, may be clearly noted by the increased speed or ability that the individual shows under such circumstances.

A case in point with teachers and students is that in which work has been continued until one or two o'clock in the morning, *after* a strong and oppressive feeling of fatigue was experienced in the earlier part of the night (about ten or eleven o'clock); then about 1 or 2 A.M. things began to clear up to such an extent that the best work of the day was done. But these second and third winds are in reality a dangerous state and should be resorted to only in rare emergencies, because it has been found that it takes longer than usual to recover from the exhaustion produced by these abnormal drafts made on our store of available energy.

If, when we are really exhausted or fatigued, action continues, chronic and even pathological fatigue regularly results, which means that the energy in the nervous system and the body, used up in the activity of work, is not fully restored by the sleep and rest of the night. That is to say, the organism is gradually being weakened each day, because the energy used is not being restored as fast as it is consumed by enjoyment and work. If this condition is not corrected, it grows gradually worse until the nerve cells are totally unable to replenish the energy lost by exertion, activity, and work, and finally they become totally exhausted or so crippled that the lost energy can never be fully restored. The following cases will illustrate the point.

Mr. Chittenden, treasurer in Lincoln's cabinet, once signed 125,000 bank notes in seventy-two hours. He worked without

intermission for three days, and as a result was a nervous wreck for the rest of his life. Experiments made since that time have shown that he could very easily have done this work in the time allowed if he had taken short periods of rest at stated intervals, as will be indicated below.

If strenuous work is continued when chronic or pathological fatigue has set in, mental collapse and insanity is the normal and inevitable result. Dr. Cowles reports the case of a Vermont farmer who was brought to a Boston hospital violently insane. In looking up the family history of the case Dr. Cowles found that there was no evidence of mental disorders in any of the man's ancestors. He found, however, that this man had been working as a dairyman for four years, getting up at 2 A.M. to deliver his milk and working generally until 10 P.M. to finish his work for the day, and that he was running this dairy business in connection with his farm and had for four or five years been trying to do two men's work. The treatment prescribed by Dr. Cowles was absolute rest, special means for forced relaxation, good food, and plenty of sleep. This in a year and a half effected a complete cure for the violent mental disorder which had attacked this man and forced a let-up in his work.

There is, therefore, a very close relation between the three important stages of chronic fatigue and certain types of insanity, as the following table will show :

STAGES IN CHRONIC FATIGUE	TYPES OF INSANITY
1. Depression	1. Melancholia
2. Exhilaration	2. Mania
3. Collapse	3. Exhaustion

(8) *Cause of Exhaustion and the Feeling of Fatigue*

The real cause of exhaustion from work is, therefore, the depletion of the subject's nervous energy to a point beyond which it cannot be restored by rest and the other processes which nature has provided for the recuperation of the nerve

cells that are being used up in the work. The most reliable means for measuring ability to do work would therefore be the metabolic changes which occur in the neuromuscular mechanisms involved in the activity, in terms of the energy-producing materials consumed in the process of work and the by-products eliminated. Such a method is, of course, impossible for students.

The only way in which students or other workers may get a reliable indication or measure of their capacity for work is by the usual symptoms of fatigue or by measuring accurately the quality and the quantity of work that can be done in a given unit of time. If a worker finds at the end of a given period of continuous work that his output is only two thirds of what it was earlier in the day, he may conclude that his capacity for work has been decreased about one third of its true amount. But this output is known to depend on many other factors besides actual capacity for work, such as incentives, interest, the desire for accomplishment, and interest in improvement. These make it difficult to get a reliable measure of one's real *vital index* or state of fatigue at any particular time.

The natural criteria of fatigue are the sensations to which continued work normally gives rise. These are a loss of interest, inability to fix the attention, headache, feeling tired, and the like. But these conscious states are not infallible signs of decreased capacity for work. A feeling of discomfort and a distaste for the work may, for example, often be present to inhibit action when objective measures of actual production show the worker to be at or near his maximal efficiency. On the other hand, these conscious symptoms may be entirely absent, as in great excitement, or in certain types of mental disorders such as the manias, or when unusual incentives act as a special driving force to the worker, causing him to feel rested and all ready for work when his organism is in reality near the point of total collapse. For most persons the feeling of fatigue is a very inefficient indicator of their real capacity for work.

(9) *The Most Reliable Method for Determining One's Capacity for Work and his Ability to resist Fatigue*

The most reliable method, therefore, for a student or worker to use in determining his capacity for work is to ascertain by experiment what his own limits of safety are. The rule would be to determine that amount of fatigue which could be fully recovered from in one normal night's sleep. Such measurement in terms of output of work, by which each student or worker would learn to interpret certain conscious signs as indices of his limits, is the only rule that can be laid down for measuring one's real capacity for work. The difficulty is that most persons do not force themselves to work intensely enough to discover their real maximum efficiency, and so form the habit of living on a much more inefficient plane of work than is desirable or necessary. Others, however, because of worry or overwork or poor health, often force themselves far beyond the limits of safety. The following symptoms of chronic and pathological fatigue and other abnormal toxic effects should therefore be carefully observed when they appear, and the necessary provisions made for complete recovery and rest as soon as these symptoms seriously threaten or continue to appear.

1. General symptoms of chronic or pathological fatigue :
 - a. Morning tiredness when regular and prolonged.
 - b. Tendency to worry over little and insignificant things.
 - c. Presence and persistence of insistent ideas.
 - d. Inability to assume ordinary business duties without extreme worry or with the usual success.
2. Mental effects of fatigue :
 - a. Lack of power of sustained attention.
 - b. Failure of memory.
 - c. Impairment of power of accurate thinking.
 - d. Loss of muscular precision — very noticeable in singing, in playing the violin, and in all work requiring fine muscular adjustment.

- e.* Loss of vocabulary — poverty of association etc.
- f.* General feeling of unrest and uneasiness.
- 3. Moral effects :
 - a.* Greater liability to outbursts of passion.
 - b.* General loss of mental control and power to resist temptation; for example, dismissing servants with slight provocation or without cause. Friends going on a trip often have a quarrel in the afternoon because both of them are too tired to react normally under a strain.

EXPERIMENT II

Problem 1. Determine by careful observation how long you can work continuously on a difficult problem or task before getting too tired to do good work. Continue your observations for several days and then answer the following questions :

1. Do you regularly or ever push yourself to the point where you are unable to do good work because of fatigue?
2. How long can you work on such a difficult task before it is advisable to stop?
3. Do you regularly stop at such points for a brief period of relaxation and rest?
4. Do you manage or drive your tasks, or do you let your tasks and work drive you?

2. CONSERVATION OF ONE'S AVAILABLE ENERGY

From what has already been said it becomes clear that it is highly important for everyone to conserve his available supply of energy and to learn to use it in the most effective and economical way. There are at least three important ways of conserving energy: (1) By taking short periods of relaxation or rest during the time devoted to study or other work. This releases the many tensions and strains on the nervous system, on the muscles, and on the other organs of the body, which pour a constant stream of toxins into the blood as well as

consume the energy stored in the nerve cells. (2) By recreation, laughter, and play, thereby relieving the strain on certain cells or organs and muscles by tapping the sources of energy in other parts of the nervous system and body. (3) By making improvements in one's attitude toward his tasks and his methods of work; this results in a saving of much energy by the invention and use of more economical methods of performing his tasks. The last of these sources of efficiency in learning and work will be discussed in Part III, Chapters XII and XVI; the other two will be illustrated in this chapter, and some directions be given for their practice.

(1) *Need for Complete Relaxation or Short Periods of Rest during Continuous Work*

Taylor found that in so simple a task as loading pig iron on flat cars (picking up a chunk of iron weighing 92 pounds and carrying it onto a car and dropping it) there was a definite law which determined the efficiency of common laborers in this type of work. He found by actual experiment that a man carrying these chunks of iron should be under load only 42 per cent of the time, being without load, either returning from the car or resting, for 58 per cent of the time. When he arranged such a schedule for his workers, he found that they were able to load 47 tons a day, instead of 12.5, which had been the average record for these workers before the short periods of rest were introduced. He also found that the new method of work seemed no more difficult or fatiguing for the workers than the haphazard methods which they had used.¹

E. D. Jones, in his work *The Administration of Industrial Enterprises*, describes two cases that give further illustrations of the marked increase in production that may result from introducing short periods of rest during long stretches of continuous work.

¹ Compare Chapter I, section 2.

Mr. C. E. Knoeppel started with workmen who, at their own gait, had been producing 16 pieces an hour. By establishing a 25-minute working period and a 5-minute rest period he obtained 18 pieces. By changing to 17 minutes of work and 3 minutes of rest, the output rose to 22 pieces per hour. Finally, by arranging a 10-minute work period and a 2-minute rest period, production became 25 pieces per hour. In another case, a record of driving 1600 rivets per day was obtained, the previous performance having been only 600 per day.

This was accomplished by establishing rest periods of 2 minutes between the driving of each 10 rivets, thus devoting 320 minutes, or 5 hours and 20 minutes, out of a 10-hour day to rest, or devoting $1\frac{3}{4}$ minutes to work and 2 minutes to rest.

It is impossible to state what the optimum number and length of these periods for relaxation and rest for students would be, since they will probably differ with the individual and with the type of work done. Two senior students at Indiana University reported to the writer that by taking five minutes for complete relaxation after each twenty-five-minute period of work, they could work continuously on a difficult task for eight consecutive hours without their efficiency being materially decreased. The average number of hours that continuous work could be kept up without loss of efficiency in the task, reported by fifteen hundred other students, was less than two hours. Such results indicate what might be accomplished if an investigation were made by each individual for his specific tasks. The determination of these most economical periods of relaxation should, of course, take into account their effect on the permanent attitude of the worker and on his total work as well as on his ability for the day or task.

It is important, therefore, to determine by careful experiment how long you can work on a difficult task without becoming too fatigued to do effective work. Then plan to

work within these limits. You should ascertain by careful tests and measurement the effect of devoting short periods of time to relaxation and rest while performing your most difficult tasks. Care should be exercised, however, to have your periods of work long enough to get some helpful effects from the "warming up" to your task and the periods for rest long enough to insure some recuperation of your powers without destroying entirely the helpful effect produced by the warming up, for in no other way can the most effective mental and physical work be done. Students and other workers should also make it their business to learn to relax completely during the short periods set aside for relaxation and rest. They should remember that tense muscles and mental anxiety pour a constant stream of toxins into the blood and use up some of their available supply of energy that should be used in actual enjoyment and work.

(2) *Suggestions on Learning to Relax*

It is normal for children and young people to relax when it is time for them to sleep or rest. But some students and many workers, because of strenuous exertions or worry continued for long periods of time, have lost the power to relax and rest or sleep in this normal and most helpful way. Such should find practical assistance in the following suggestions on how to relax.

a. Need for learning how to relax. All intellectual workers should remember that worry exhausts them more than actual work, and that it is within the power of their own will to change from a state of anxiety to one of composure. They should make it a point to take frequent periods for complete relaxation and deep breathing, combined with setting their minds completely at ease. Such periods for the relaxation of the body give freedom to the mind. Inventors have often been able, while lying in bed, to devise their apparatus with a

perfection they found impossible when they attempted to study it out in the shop. And many of the world's best poems have been conceived while the poet was lying in a relaxed position. Some authors state that they voluntarily go to bed in the daytime and get perfectly relaxed in order that their minds may do the most effective work. Much constructive thinking is done in church during the music and service or after the voice of the preacher has soothed the nerves of his audience and has induced a more composed condition in their minds. And most college teachers would be surprised if they knew how many costumes had been planned and how many parties attended during their lectures, partly because of the soothing effect of their discourse.

b. How to relax. The ability to relax your body and mind at will and to remain in an efficient condition, free from nervousness and exhaustion, is a thing that anyone may acquire. It may be accomplished by exercising a voluntary control over the muscles of the arms, the legs, the face, and the lower jaw, by breathing slowly and deeply, and by placing the body in a general relaxed condition during these periods. The writer has been greatly helped by observing the way babies and wild animals relax when they sleep or rest. You must begin with one part of the body — your hands or legs or lower jaw. As soon as you get full control over this, pass on to the next until the whole body and mind are fully relaxed. Professor Scott writes :

This antecedent condition of relaxation brings all the forces of the mind and body more completely under control and makes it possible to marshal them more effectively. It also gives one a feeling of control and assurance, which minimizes the possibility of confusion and embarrassment in the presence of an important task. The possibility of developing the power of relaxation by means of special training is being taken advantage of in teaching acts of skill, in all forms of mental therapeutics, and in numerous other instances where overtension hinders the acquisition or accomplish-

ment of a useful act. By assuming the attitude of assurance and composure, the actual condition is produced in a manner most astounding to those who have never attempted it.¹

No worker can do his best work when he is hurried and fearful or when he is misdirecting his energy and spending it as uselessly as a tugboat blowing off steam.

If further reasons were needed to show why the habit of relaxation should be cultivated by all students and other workers, they may be found in the following passage from William James's *Talks to Teachers on Psychology*, where, in discussing the "Gospel of Relaxation,"² he says:

By the sensations that so incessantly pour in from the overtense body, the overtense excited habit of mind is kept up; and the sultry, threatening, exhausting, thunderous inner atmosphere never quite clears away. If you never give yourself up wholly to the chair you sit in, but always keep your legs and body muscles half contracted for a rise; if you breathe eighteen or nineteen instead of sixteen times a minute, and never breathe quite out at that — what mental mood *can* you be in but one of inner panting and expectancy, and how can the future and its worries possibly forsake your mind? On the other hand, how can they gain admission to your mind if your brow be unruffled, your respiration calm and complete, and your muscles all relaxed?

Moreover, by such useless expenditure of energy you are not only wasting but exhausting your supply of available energy, which should be used in enjoyment or effective accomplishments.

(3) *Need for Recreation and a Change of Work*

The need for recreation and play is not generally understood. All animals and people play, and have invented various forms of games and amusement which have been indulged in

¹ W. D. Scott, *Increasing Human Efficiency in Business*. The Macmillan Company, 1911.

² Page 211.

since before man began to keep a record of his doings on earth. Herbert Spencer and Schiller believed that animals and children play because they *must*, that they play to work off their surplus energy. But they failed to explain the particular direction which the activities of play take in a given individual or species, or why children and animals often play when they are physically and mentally exhausted.

Carl Gross maintained that play was nature's school wherein each individual learned through play to perform those acts — fighting, searching for food, etc. — which are required in his later life to maintain his existence in the world. G. Stanley Hall pointed out that in these plays and games all animals, including man, live over, as it were, or pass through, some of the more important experiences encountered by the race. He believed this to be a necessary means for developing the most complete and well-rounded individual mentally and physically, one capable of performing all the necessary tasks which he might encounter in his complex experiences with the world. It was nature's way of doing this, he thought.

These theories help us to understand why animals and men play. They also explain why their plays and games take the particular forms that they do. Play is the great school-master of the race, teaching those who play the ways of doing well-nigh everything that it is possible for them to do with their present mental and physical equipment. Nature has made it enjoyable or pleasant for them to do this, thus making sure that they would prepare themselves for the necessary tasks of life or for doing the things which they would choose to do when exercising their full capacities and powers. These theories, however, do not explain why adult man continues to play, or why amusement, laughter, and recreational activities of all sorts are so generally indulged in by adult animals and by man and are so necessary for human efficiency, enjoyment, and health.

It was left to G. T. Patrick to add a very important element

to these earlier explanations of play. He has pointed out that all plays and games, all forms of sport, laughter, profanity, alcoholism, and even war, are psychologically related.

According to him animals and men play and engage in many scores of activities to get relief from the strain and stress which work and the complex artificial conditions of our modern social and economic life impose upon our organisms. In play other muscles and other brain centers are called into use than those exercised in our work. This tends to restore a proper balance in the organism and to maintain a harmonious relationship between the various organs and functions of the body. Plays and games, amusement crazes, dancing-manias, laughter, profanity, alcoholism, war, are believed by Professor Patrick to be nature's normal reaction against a manner of life that is all too serious and tense. He considers all such forms of response as an indication in the individual of a lack of physiological adjustment to his present complex surroundings. He believes that we do not need to emphasize social adjustments in our education so much as the physiological adjustments that are required for efficiency and for our mental and physical well-being and health. New conditions and duties of the individual in our present complex social world place a great strain upon the nervous system, causing a marked increase in nervous disease and in mental instability, and a breaking down of the kidneys and of the nervous and digestive systems. Patrick points out that because of this excessive strain these old-age diseases are reaching down into middle age and reaping richer harvests each year. Many studies have shown that these diseases and the maladjustments which Patrick has described markedly decrease efficiency through the working years, besides filling those years with misery.

Professor Patrick has also pointed out that this is not an age of peace, of calm, of poise, of relaxation and repose, or of harmony in action and thought, but an age conducive to extreme fatigue of the higher brain centers. This creates an

unusual and imperative demand for relaxation and recreation to relieve, by the exercise of the other parts of the body, the tensions placed on the overworked parts of the brain.

It is Patrick's belief that when claims are made on the working brain in excess of the possibilities of natural repair by recreation and play, or when nature's methods of repair are neglected, everybody resorts to artificial means of restoring a proper balance in the organism. This would account for such peculiar reactions in the race as the excessive use of alcohol, opiates, tobacco, and for such social upheavals as jazz music and war. All these he considers as mere attempts to get relief from the excessive tensions and strains placed upon the human organism by the complex and artificial conditions of present-day social and economic life. They are forced forms of relaxation psychologically as natural as they are physiologically artificial and destructive to the individual and to the race. He further believes that these destructive forms of relaxation cannot be banished from the world except by substituting for them the more normal and healthful forms, and these should be encouraged by society and practiced by all in the interest of greater personal efficiency and health.¹

These theories and facts have been summarized to show the necessity for conserving all our powers and talents by planning in our work and everyday life for relaxation, laughter, and recreation, the great restorers of a proper mental balance and a physiological harmony in the organism.

No engineer or architect undertakes to build a bridge or a modern "skyscraper" without an accurate knowledge of the materials he must use. The mind and body of a student or worker is the material with which he builds his life. This material is put under great tension and strain by the excitements and duties of modern life. Efficiency in work and mental and

¹G. T. W. Patrick, *The Psychology of Relaxation*. Houghton Mifflin Company, Boston, 1916.

physical health require that a due amount of attention be given to *recreation*, or that a certain balance be maintained between recreation and work.

Reports from fifteen hundred students at Indiana University in December, 1924, showed that most college students do not plan for proper recreation. Many do not devote any *regular* time to this necessary element of human efficiency and health; others waste their time by devoting an excessive amount to recreation and play. The average time which these students regularly devoted to recreation was less than an hour each day. Their reports of how they actually spent their total available time for a week revealed the fact that little attention was given to the *kind* of recreation that was needed by them.

As a part of Experiment II you should therefore determine whether you are maintaining a right balance between these recreational activities and the time you devote to your regular tasks or work. Some form of relaxation or play is absolutely necessary to insure efficiency and to maintain mental and physical health. It is nature's way of restoring a proper balance throughout the body by resting the used parts and by exercising other nerve centers. For effective work, therefore, and to maintain the most helpful attitude toward one's work and the world one must plan for proper recreation, taken regularly each day.

Such recreation may take many forms; as, laughter, golf, tennis, hockey, dancing, attending a funny show, swimming, playing ball, walking, novel reading, gardening, music, religion, the creation and study of art, or other forms of activity which relieve the strain on the muscles and brain areas exercised in our regular work.

It should be clearly understood, however, that such activities or changes of work, although absolutely necessary for mental efficiency and health because they permit the energy to be restored in other brain and muscle cells, are not equivalent to actual rest, since they draw on the same vital bank account of

energy that is used in all mental and physical work. This must be restored by proper food, by good fresh air, and by complete relaxation and rest during sleep, which are nature's ways of restoring lost energy and "knitting up the raveled sleeve of care" that our daily duties and tasks are continually unraveling by the sensations, feelings, and thoughts which we are experiencing throughout our waking life. What is even more imperative, therefore, for human efficiency and normal enjoyment and health is to learn to make suitable provisions for the restoration of all the energy used in our enjoyment and work, so that a residuum of energy may be maintained not only for our daily tasks but for all emergencies which life presents.¹

(4) *Difference between a Change of Work and Recuperation or Rest*

It should, perhaps, be further emphasized that a change of occupation, though often advantageous and highly desirable, is not equivalent to rest, for the new activity draws on the same store of energy as the previous work. All human activity, as described above, causes a general reduction of one's surplus energy by drawing from the blood stream the necessary constituents for the activity involved. At the same time it causes a general poisoning of the brain and body cells because certain poisonous particles produced by the activity are thrown into the blood stream and circulated throughout the body. Therefore every case of human activity produces both a local and a less pronounced general effect. And while other parts than those that have been acting may be more easily exercised because of these local effects and because the brain and body cells which produce the activity are rested and replete with energy, the total supply of energy is in no way replenished by the shift in activity. Both types of work draw

¹ How our mental and physical energy is restored during relaxation and sleep will be discussed in Chapter IV.

on the same ultimate source of energy which is being used up even after a change has been made in one's occupation.

If the second task requires the consumption of less energy, it will give some relief. Such changes in work are usually made when one becomes tired. One is quite likely to change to a more pleasurable type of work, a type which consumes less energy than the task that has been relinquished. This helps to explain the common impression which people have that a change in occupation constitutes a real rest. It would be far better, however, to say that there is in such a case a reduction in the total amount of energy consumed and a relief from the unpleasant feelings which arise from working particular muscles and specific brain areas nearly to the breaking-point. Such overwork always produces a dangerous situation that nature attempts to correct, as will be pointed out later on. A change in occupation, though advantageous and highly desirable at times, is never a real rest and should not be so interpreted by a worker or a student.

EXPERIMENT II (CONTINUED)

Problem 2. To determine the effect upon your working efficiency of short periods of relaxation and rest taken during prolonged periods of work.

Method a. Ascertain by several repeated tests how long you can continue a difficult task without impairing your efficiency or producing a hurtful attitude toward your work. Next determine the effect which the taking of short periods for relaxation and rest has upon your ability to perform one or more specific tasks. Vary the length of the periods of work and the periods for relaxation and rest until your optimum for that task has been ascertained. Keep a careful record of your observations and results in each test, being careful to keep all other conditions constant except the one of which you are trying to measure the effect. Record accurately your output or actual ability to work under each set of conditions which you have arranged, so that you may determine the most effective method of distributing your effort. Then arrange

the length of your periods of work and rest so as to get the greatest possible returns for the energy expended.

Method b. Determine by careful observation and experiment the extent to which you are succeeding in keeping your body thoroughly relaxed during these short periods for rest ; also whether or not you are succeeding in keeping your mind calm and free from anxiety and strain when you are not actually at work. Then take such steps as will enable you to develop proper habits of relaxation and the most helpful mental attitude toward your work. Remember that the inefficient student or worker lives like an army with all its reserves engaged in action, whereas efficient men and women organize their life and work so as to have large stores of nervous energy in reserve ready for use when necessity or occasion requires its presence or use.

EXERCISES AND QUESTIONS ON THE TEXT

1. What is the true source and seat of human energy?
2. What experimental evidence can you give in support of your answer? How much reserve energy does a normal human being possess?
3. In what ways does one's residuum of energy condition personal efficiency in study and work?
4. How do we attempt to measure the amount of an individual's fatigue at any given time?
5. How may we classify people on the basis of their susceptibility to fatigue and their power to recover from its normal effects?
6. In what ways is the energy of the body used? How is human energy normally released?
7. What are the natural drafts made upon your total supply of vital energy? What does a normal "work-curve" really represent?
8. What are the normal effects of overwork? What is nature's way of restoring the vital energy used in study and work?
9. What is nature's way of informing the individual that he is becoming fatigued? What is the cause of this exhaustion and the feeling of fatigue?
10. How would you proceed to determine your own capacity for work? your susceptibility to fatigue?
11. Perform Experiment II and answer all questions asked.

12. Explain how your available energy may best be conserved. Illustrate by a quotation from your experimental results the value of relaxation and short periods of rest taken during continuous work (Experiment II, Problem 2).

13. Have you learned to remain entirely relaxed when you are not engaged in any kind of work? How would you instruct another person who is learning to relax?

14. Explain the need for a change of work and what real recreation accomplishes for the organism of a worker.

15. What forms may recreation take for a student or a professional man? for a worker who uses much physical energy in his work?

16. Explain the difference between recreation or change of work and complete recuperation or rest.

17. Discuss the importance of sleep as a means of restoring human energy.

18. Have you made a perfect adjustment in regard (1) to the conservation of your supply of energy, (2) to its proper and economical use, (3) to its restoration through rest, sleep, and the consumption of the right kind and amount of air and food?

REFERENCES

- JAMES, WILLIAM. Talks to Teachers on Psychology, pp. 199-229 ("The Gospel of Relaxation"). Henry Holt and Company, 1916.
- LEE, FREDERICK S. The Human Machine and Industrial Efficiency. Longmans, Green & Co., New York, 1919.
- MUSCIO, BERNARD. Lectures on Industrial Psychology (Lecture II, "Psychology of Business"). E. P. Dutton & Company, 1920.
- OFFNER, MAX. Mental Fatigue. (Translated from the German by G. M. Whipple.) Warwick and York, Baltimore, 1911.
- PATRICK, G. T. W. The Psychology of Relaxation. Houghton Mifflin Company, Boston, 1916.

CHAPTER IV

SLEEP AND OTHER MEANS OF RESTORING THE ENERGY USED IN STUDY AND WORK

In the preceding chapter you were shown how to conserve your available energy and how to prevent unnecessary fatigue : by relaxation, by taking short periods of rest, and by a change of work. In this chapter we shall consider the general effects of fatigue and the means which nature has provided for restoring the energy that is consumed by study and other kinds of work.

1. PHYSIOLOGICAL AND BIOLOGICAL NECESSITY FOR REST AND SLEEP

The energy of the body is restored during periods of complete relaxation in sleep, by food and the oxygen taken from the air.

Many theories have been proposed to explain the marked contrast between the period of clear and intense consciousness experienced in our waking or most active states of life and the sleeping state, which is psychologically characterized by a total absence of the awareness of what goes on within or without the body. In fact, there has always been something uncanny about this "darkness and light that divides the course of time," mainly because of its outward resemblance to death.

With the various theories that have been offered to explain the mechanism of sleep, which produces these marked changes in consciousness, we need not here be concerned — whether by self-poisoning of the nervous system, by an exhaustion of certain essential elements in the nervous system involved in its normal functioning, by changes in the cerebral circulation, or by a complete exhaustion of certain processes or elements

involved in producing these conscious states. All agree that sleep is necessary for all animals that have a nervous system. It is not a disease but a native characteristic of the organism, and is in part a reaction of defense to protect the organism against further stimulations and fatigue, in part a means for replenishing the energy lost through enjoyment and study and other work.

The lower forms of animal life, such as microbes, infusoria, and the like, do not sleep; and Claparède believes that the phenomenon called sleep developed in the higher animal forms because the animals whose activity was broken by these periods of immobility or repose were favored by the accumulation of the energy provided during these periods of rest to manifest a more intense activity during their waking state. This favored adaptation or learning and their consequent survival. He even suggests that such periods of immobility may have been derived from the inhibition of defense which has played, by their feigning of death, such an important rôle in the evolution of certain animal species.

Sleep is, therefore, a physiological and psychological necessity. There are no reliable records where a human being has gone without sleep for one week. Professor Patrick of the University of Iowa conducted some experiments in which he tried to stay awake for 90 hours. His experience for the first 40 hours showed nothing remarkable. After 40 hours he found it almost impossible to keep awake. He caught himself taking short naps while he was reading or speaking a sentence. Later he was troubled with visual hallucinations. His ability to do work dropped off materially. What he had been able to do before in 160 seconds now took him 1000 seconds. Another subject gave up the attempted work in despair after 1200 seconds, saying he was wholly unable to do it. Before the experiment and the loss of sleep this subject could do the work in 100 seconds without difficulty.

Professor Patrick also found that the recovery from fatigue

after his experiments was more rapid than one might expect. That is to say, he did not have to sleep as many hours as he had lost to recover, showing that recuperation may take place at different rates during sleep. He also found that during sleep there was a marked modification of blood supply to the body, the temperature and general vitality of the body being materially lowered.

2. DEPTH OF SLEEP AND RECUPERATION DURING SLEEP

A number of experiments have been made to measure the intensity of sleep, or depth of unconsciousness that occurs during sleep. This has been studied by the simple device of

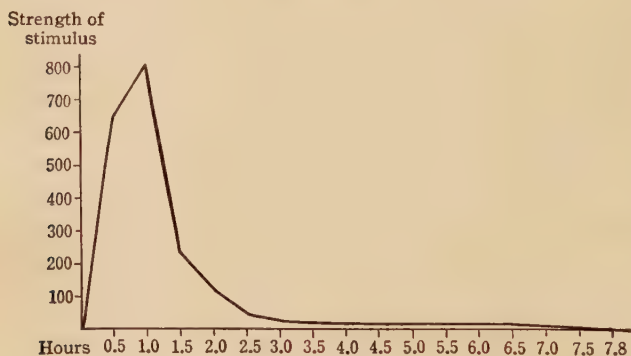


FIG. 4. Curve showing intensity of sleep (Kohlschütter)

ascertaining the intensity of the sensory stimulus required to awaken the sleeper. Kohlschütter arranged a pendulum so that it would fall against a sounding-plate. At regular half-hour intervals during the period of sleep he applied this stimulus, increasing it each time in intensity until his subjects awoke. In this way he determined the depth of sleep for several subjects at every thirty-minute period during a normal night's sleep. His curve showing the depth of sleep for a continuous period of eight hours is given in Fig. 4.

According to this curve the greatest depth of sleep is reached about an hour after the beginning of sleep. After the third hour of sleep the depth of sleep was very slight, the intensity being indicated by the height of the ordinates or strength of the stimulus required to awaken his subjects.

3. MORNING AND EVENING SLEEPERS

That the intensity of sleep and the curve showing its depth vary somewhat with the individual and also with the surrounding conditions is indicated by experiments made by other investigators. Mönninghoff and Piesbergen, using the same method and technic employed by Kohlschütter, obtained a curve showing a marked second rise in the depth of sleep for certain individuals between the fourth and fifth hours of continuous sleep. Czerny and Michelson verified these results, both for children and adults, and believe that there are two classes of people in this respect: those with morning dispositions, in whom the maximum of mental efficiency occurs early in the day, and those with evening dispositions, whose maximum mental efficiency occurs in the afternoon or at night. The former might be called evening sleepers because they have their period of most intense sleep and probably get their best rest in the early part of the night. Their sleep is intense during the first part of the night and lighter toward morning. They can normally do their best work in the morning and are greatly aided by short periods of rest or naps of short duration. Watchmen, nurses, and physicians would therefore find it to their advantage to possess such habits of sleeping and resting.

Those with the evening disposition reach their maximum efficiency in the afternoon or late at night and are believed to reach their maximum intensity in sleep with relative slowness, or only after they have been asleep from one and three-fourths to three and one-half hours. They may therefore be called

morning sleepers, because they get their most restful sleep during the last two or three hours of sleep. Short naps would not be profitable for this type of individual, and such a person should not select occupations like nursing, railroading, etc., where his periods of rest would regularly be broken into and he would thus be prevented from obtaining his normal amount of rest in sleep.

The old injunction "Early to bed and early to rise" would therefore not be an advisable course of action except for the individuals who get their best rest soon after they fall asleep.

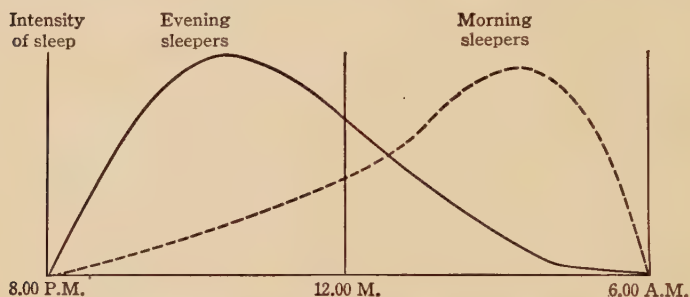


FIG. 5. Diagram showing difference between morning and evening sleepers

The effect of such a practice upon each of these types of sleeper may be inferred from the curves in Fig. 5, which indicates the character of the recuperation that probably takes place in each type during the early and the later part of a normal night's sleep.

These individual differences naturally raise the question whether the depth of sleep may be taken as a measure of the amount of recuperation that takes place during sleep. It is by no means certain that recuperation takes place equally throughout the whole period of sleep or most rapidly during the period of deepest sleep. The slight benefit so often derived from short periods of sleep suggests that the anabolic processes

which occur during the recuperation from fatigue do not become very effective until the period of deep sleep has passed. It is therefore important not merely to determine the amount of sleep that is required for effective work but also to ascertain how one may obtain the most actual rest during the period of sleep.

4. GENERAL NATURE OF SLEEP AND ITS COUNTERFEITS

A number of other things have been determined about sleep that have considerable practical importance for students and other workers, such as the well-known fact that our sleep is more intense in winter than in summer, and on dark than on moonlight nights. These facts are important enough to make it desirable for a hard-working individual to plan to get more hours of sleep in the summer, when his rest is not so thorough and recreational.

It has also been demonstrated that sleep artificially produced by drugs, loss of blood, extreme cold, hypnotism, etc. does not produce the beneficial effects which result from natural sleep. That is to say, the recuperation of the tissues during such artificial sleep does not at all equal the building-up processes that occur during natural sleep.

Moreover, the whole organism never seems to sleep at once. As a rule it goes to sleep from the top downward. A person can set a time to get up, and wake almost on the minute. In such cases it is believed that part of the brain does a sort of signal duty, causing the individual to awaken at the proper time. This is probably why one does not sleep so well when he sets an alarm clock or when he determines to rise an hour earlier on a particular day.

It has also been ascertained that our interests determine to a great extent what shall awaken us. A physician, for example, hears the telephone or doorbell while his wife sleeps; but when the baby cries or moves, it is his wife who wakes while

the doctor sleeps. One reputable psychologist reported that he wished to wake at six o'clock on a particular day. He woke about midnight and recalled that his clock was half an hour fast. What he did was to sleep on until the hands of the clock reached the six-thirty point and then to wake.

5. PRACTICAL SIGNIFICANCE OF DREAMS

Such phenomena as the preceding throw much light on the explanation of dreams and on their practical significance for recuperation and personal efficiency in study and work.

In sleep the ordinary associative connections are all broken up or disarranged because parts of the brain are wholly or partly inactive. This helps to explain why the mind, during dreams, acts in such fantastic and unreal ways. There are two sorts of dreams, night dreams and early-morning dreams. As a rule the night dreams take us back to the immediate past, sometimes to the remote past. The morning dreams are more fantastical. We dream more than we think or are aware of, because only a small percentage of our dreams are recalled in our waking life. As a rule we do not dream of important things, but of trivial things which appear to us in our dreams as of the highest importance. For example, a noted psychologist dreamed that he was making a speech before an immense audience and that his eloquence was moving his hearers to continuous shouts of applause. He awoke while in the midst of his speech and found that the sentence he had just delivered was a perfectly nonsensical expression. Our mental activity is much changed in our dreams. An Englishwoman wanted, in her dream, to send a sum of money across the ocean, but she could not think of any way to send it. The idea of a steamer never occurred to her. After racking her brain for some time to think of a way to send it she finally thought of a fish basket, which she used to send the money across the Atlantic.

These and other facts indicate why we should never encour-

age dreams or make it a practice to recall them in our waking life. They are indicative of light and unrestful sleep and should be discouraged in every possible way. They are often produced by external and physical conditions; more often still by physiological and chemical changes occurring within the organism. Overwork and a heavy meal may cause a series of contending dreams and produce in one's dreams a series of mental and physical exertions resembling war. If one sleeps cold or in a draft of air one may dream of a snowstorm etc. Such conscious and neural activities, even in dreams, interfere with the normal relaxation that should occur during sleep.

The only practical significance of dreams, therefore, is that they reveal to the dreamer that he is not getting his normal rest, that something is wrong, and that proper steps should be taken to induce a more restful sleep.

6. EVOLUTION OF SLEEP AND OF THE SLEEPING STATE IN MAN

As already stated, the lowest animal forms do not have this rhythm of waking consciousness or period of intense activity followed by a period of mental and physical inactivity called sleep. The amoeba never sleeps. The clam is half asleep all the time. As we pass to the higher animal forms we find this rhythm called sleep in a marked and permanent form. In man these extremes — intense activity followed by periods of unconsciousness — are still more marked. That is to say, when man is awake he is intensely conscious and active. When he is asleep he is more deeply unconscious and harder to waken than any other animal, as Fig. 6 will show.

7. PROPER ALTERNATION OF PERIODS OF WORK AND REST

Because of differences in physical and mental endowments and in the physiological habits formed in early life, marked individual differences are found in susceptibility to fatigue and in the power to recover from the effects of work. As was

pointed out in Chapter III, some are easily fatigued and recover slowly. Others are easily fatigued and recover quickly. Some fatigue slowly and recover rapidly, and still others fatigue slowly and recover just as slowly.

These personal differences throw important light on the relationship which should exist in any given case between the periods of work and rest in continuous mental or physical work. The amount of rest which one should take clearly depends upon his susceptibility to fatigue and upon his power to recover from the normal effects of work. The time that may

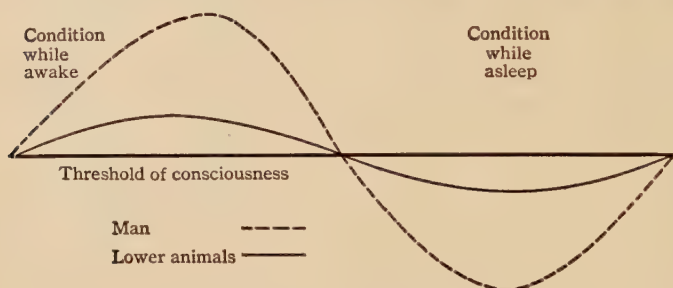


FIG. 6. Difference between animals and men in the rhythm of waking consciousness

be devoted to work depends upon the nature of the work done and on the power to resist fatigue, or upon the amount of available energy which one possesses and upon how economically it is expended on the task in hand.

Those who recover quickly from fatigue would profit greatly by short periods of rest and by a single day off. Those who recuperate slowly would come back to their work after a single day's vacation less able to work than they were before, because they would lose more in "warming up" than they had gained in recuperation by one day of rest. For those who recover quickly a month's vacation would be a waste of time. For those who recover very slowly it might be too short if they were greatly fatigued.

A certain balance between work and rest must therefore be observed if the greatest personal efficiency is to be obtained. No general rules can be given. The length of the period of rest required depends upon the nature of the work and upon the length of the working period. It should be long enough to permit recovery from fatigue, but not so long as to lose the advantageous effect obtained from the warming up to the task which occurs in all intense and continuous work.

Advantageous schedules have been worked out for many kinds of tasks, as was shown in the preceding chapter. Such schedules always increase the efficiency of the individual if the correct relationship is determined. Such a schedule has, for example, been worked out for those who fold handkerchiefs. Each hour of the day is divided into six-minute periods. For every five minutes of work one minute is allowed for relaxation and rest. In this way one sixth of the day is spent in rest, yet actual measurement has shown that the workers can and will do about three times as much work under such conditions of work and rest as they do when they are permitted to work according to their own methods, where the average worker pays little attention to the proper alternation of periods of work and rest.

Students and other workers would do well, therefore, to determine for themselves and for their more important tasks the exact amount of time that should be devoted to work and to rest to obtain the best results. In general, students and teachers will find that a five-minute rest period for each hour or half-hour of work would yield marked improvements in their general efficiency. A number of college students have reported to the writer that with such a schedule they could continue their work on a difficult task for as long as seven or eight hours without any noticeable loss in efficiency; whereas those who never adopted such a schedule report that they could work on a difficult task less than two hours before their efficiency in the task was noticeably interfered with.

More important, however, than any of the points thus far discussed is the matter of determining the amount of sleep that is required for complete recuperation and of ascertaining the best way of obtaining this necessary amount of relaxation and rest.

8. AMOUNT OF SLEEP AND REST REQUIRED

It has been said that the day should be divided into three equal parts: eight hours for sleep, eight hours for recreation, meals, and self-improvement, and eight hours for our regular work. This is a false deduction, as may readily be seen from the facts already described. The amount of sleep actually required at any particular time depends upon the susceptibility to fatigue, upon the amount of cumulative fatigue present at the time, and upon the habits of sleep and rest acquired, or upon the power to recover from fatigue. Jeremy Taylor carried on his work with only three hours of sleep a day. Napoleon required only five hours of sleep. During his most vigorous campaigns he never took more than five hours of sleep. Bismarck and Gladstone required eight hours of sleep each day. Many people require nine or even ten hours of sleep.

There is great danger, therefore, in setting up standards attained by a few unusual individuals for use by people as a whole. If sleep is required to carry on the proper processes of repair, the amount of sleep needed by a given individual would depend on his susceptibility to fatigue and on his power to recover from fatigue or on the habits of sleep which he has acquired. Some persons are able because of greater vitality or better powers of recuperation to preserve a proper balance between waste and repair on much less sleep than others. The exact amount of sleep required is an individual matter, therefore, and can be determined only by actual experiment in which the worker should determine during a long period of time the actual amount of sleep that he needs to keep him in

the best state of mental and physical vigor. Such an experiment should extend at least over a month or two of time so that any cumulative effect due to the shortened hours of sleep might be detected. In order that each reader may determine for himself how much sleep he needs and the best way to get a maximal amount of rest during this period of time, the writer has devised the following experiment and suggestions on favorable conditions for sleep and for going to sleep.

EXPERIMENT III

General purpose. To determine how much sleep you require for the most effective work and how to get the most recuperation and rest during sleep. Answer here the following questions and, if necessary, perform the experiments described under Problems 1 and 2.

1. Do you know how much sleep you require each day to keep you in the best mental and physical condition for work?

2. If you have determined the amount of sleep you need for the greatest efficiency in study and work, indicate the amount here and omit the rest of this experiment.

3. Do you arrange to get this necessary amount of sleep each day?

Problem 1. To determine how much sleep is required for the most efficient enjoyment and work.

Method. Keep an accurate record of the time you normally spend in sleep each day for one or more weeks to determine just what your present habits of sleeping are. Next ascertain whether this is the most efficient amount of time that could be devoted to sleep. Do this by varying the amount of sleep taken and by measuring as accurately as you can the amount and quality of the work you can do when the amount of sleep is thus decreased or increased. Great care must be exercised, however, to keep all other conditions — the amount of recreation and rest taken and the amount and kind of work done — constant so that it may be known that the increase or the decrease in efficiency shown by your measurements is caused by a decrease or an increase in the amount of sleep you have arranged to take. You must also carry your observations and measurements over a period of time sufficiently long

to make sure that the increased efficiency is not due to extra incentives which your experiment may have aroused, and that no cumulative fatigue effects have been produced while you have been trying to get along on fewer hours of sleep than you thought were required.

The experiment is, as may readily be seen, a very important and difficult one to perform, but the difficulty of the long period of time required to perform it may be largely avoided by keeping an appropriate record sheet of your results. It may take several months to obtain and verify the results you really seek, but to be most efficient in your work you should know with scientific accuracy how much sleep you actually need.

Results. The experiment when completed will show (1) how much sleep you normally need; (2) whether you are getting this necessary amount; (3) how much your present efficiency in learning and work may be increased by arranging to keep yourself in this most efficient mental and physical condition by taking the right amount of recreation and sleep.

Proper attention to this factor of personal efficiency will produce other important results. It will, for example, enable you not only to do more and better work but also to resist colds and other forms of contagious diseases which reduce your total efficiency. It will also prolong the period of maximum efficiency in life. The human body and mind is much like an automobile or any delicate machine: it wears out by abuse or by the accumulation of the poisonous products which its normal activity produces. If these are promptly and completely eliminated, the machine works more smoothly each day and will wear much longer than it otherwise would.

Problem 2. By observing the following suggestions for sleeping and for going to sleep determine for yourself how you can get the most recuperation or rest out of the time you actually devote to sleep each night.

9. FAVORABLE AND UNFAVORABLE CONDITIONS FOR SLEEP

The most favorable conditions for sleep are attained when we shut out as far as possible all external stimuli. We try to get in a comfortable physical position in order to neutralize

the sensations which come from the skin. We close our eyes and try to shut out all sensory stimuli. The importance of making this group of conditions favorable is shown by the observations made by Professor Stumpf on a German boy whose only organs of special sense were one eye and one ear. Professor Stumpf observed that when this boy closed his eye after his ear had been stopped up with wax, he promptly fell asleep. Our *minds* should therefore be as free as possible from internal and external stimulation when we go to bed, so that there will be a minimum of stimulation to produce wakefulness or dreams.

10. SUGGESTIONS FOR GETTING THE MOST REST DURING SLEEP

There are many devices which may be used to make yourself a good sleeper, and nothing is more important for health and efficiency than to make and keep yourself a good sleeper. If all mental and physiological conditions are made favorable, sleep will naturally ensue. Sleep cannot be controlled or directed by the mind, no matter how hard you try. Fixing your attention on the desire or the necessity of going to sleep, thinking you must do it on account of your work on the morrow, will, of course, merely keep you awake. To be able to *fall* asleep you must relax your body and free your mind from *all* stimulation and work. When this has been accomplished, you will fall asleep as naturally and as surely as a healthy child.

How to go to Sleep

To free your body and mind from the muscular tenseness and cramped state of attention that does truly "murder sleep," a number of helpful suggestions have been made, which may here be given for the guidance of those who, because of bad habits or disease, have lost the power of natural and restful sleep.

The first necessary condition for going to sleep is to relax all the muscles of the body and to let the bed hold you, as it should. Anyone can get this voluntary control over all his muscles after a little practice. You should begin with the arms and legs, taking them one at a time, and see that they are relaxed and stay relaxed. Then proceed to other parts of the body, such as the muscles of the head, neck, and lower jaw. If this cannot be done or is too difficult, artificial means should be resorted to before going to bed, such as taking a warm bath, taking a walk, or going through with a well-balanced set of physical exercises for fifteen minutes.

This relaxation of the muscles and body also helps to relax the mind, which process may be further aided before going to bed by such methods as a ten-minute rest, by bathing the head with cold water, etc. After retiring, the mind may be relaxed, in case of need, by such devices as the following: (1) by letting one's attention follow the natural flow of the mental images that spontaneously float through the mind; (2) by rhythmical counting; (3) by thinking continuously of the rocking of a ship or of sheep jumping over a low fence one at a time, and continuing the process in an endless chain until you fall asleep; (4) by thinking of how you feel or look when asleep or how a child looks when it is asleep. These are mere devices to keep the mind free from serious activity and work, which keeps you awake.

In cases where chronic or pathological fatigue has produced prolonged periods of chronic insomnia the individual should seek medical advice or consult a reputable psychologist, because he needs assistance, that he cannot himself provide, to open up the normal avenues to recuperation and recovery from the fatigue which he has allowed to accumulate to a stage of real danger to his efficiency and health. Nothing is more important for a student or worker to learn than the art of keeping himself a good sleeper so that one's brain cells will be properly rebuilt during this restful sleep.

EXPERIMENT III (CONTINUED)

Problem 3. Determine by careful observations, extended over a week or two of time, in what two hours of the day you can do your best work on a difficult problem or task and answer here in your text the questions given below. The data should be accurately secured and preserved for use in later experiments.

1. Are there one or two of these best periods in your working day?
2. Is the period of greatest efficiency very noticeable or marked, or did you have trouble in determining it?
3. Does it set in and end pretty much at the same time each day?
4. Do you plan to do your most difficult and important work at these best periods in your day?

11. NECESSITY FOR TEMPERATE EATING AND FOR WHOLESOME FOOD

The energy-producing material for muscle and nerve, as well as the materials needed for structural growth, is supplied by the food we eat and by the air we breathe. The quantity and quality of the food we consume and the air we breathe are therefore vital factors in producing personal efficiency in study and work.

Notwithstanding this fact college students and people generally pay relatively little attention to the selection of their food, and fail to develop right habits of breathing, which alone can supply the body with the proper amount of oxygen needed for the best enjoyment and work.

No detailed account of the value of different kinds of food can here be given or of the value of specific foods in terms of energy-producing units, nor can we discuss their proper combination into menus suitable for different individuals. We know more about the feeding of chickens and pigs than we know about the effects produced on human beings by different kinds and amounts of food. But much that is valuable is

known; and all students and workers should realize that they are, or become, what they eat, and that the woman who runs a college boarding-house or a cafeteria does a more fundamental and important work than any professor.

Therefore, all students and those desiring to make and keep themselves truly efficient must see that their food is of good quality, varied in character, with meats well balanced with vegetables and fruits; that the quantity is ample but never excessive, the exact amount needed depending upon the individual's activities. College students should never try to save money on their food, and they should realize that the best measure for determining whether the proper conditions with regard to food are fulfilled is their state of efficiency and health rather than their appetites or taste, which too often are perverted by bad habits formed in early life.

It is also well to remember that it is not how much or what kind of food you consume that is the essential thing, but the proportion that is actually transformed into body tissue or fuel used in doing your work. This assimilation of food depends primarily, of course, upon the functioning of the digestive organs. And here students should realize that they have more or less of a direct control over the whole process.

Recent studies, and this country's experience in the World War, have shown that the state of mind has much to do with the proper digestion and assimilation of food. Fear will inhibit the flow of the saliva in the mouth, just as other thoughts (caramel ice cream, for example) will cause it to flow in great profusion. The other juices involved in digestion are affected in the same way. Experiments have shown that the rhythmical movements of the stomach and intestines that occur during the digestion of our food may be completely inhibited by great emotional disturbances. It was found, for example, in the World War that the courage, health, and general efficiency of the American soldiers were greatly improved by providing more attractive surroundings in the mess camps

and by a more careful planning of their meals. This gave them a different mental attitude that affected not only their personal efficiency but also their courage and endurance and strength.

Whether one's food shall be made available for his body needs, therefore, depends, among other things, on whether he is cheerful or sad, fearful, angry, or calm, tired or rested, while he is eating and digesting this food. It is therefore of the highest importance to use every means at our command to assist nature in the digestion and assimilation of our food; for when digestion breaks down, the human machine soon wears out and personal efficiency begins to lag. It is by no means an accident that the leading hotels of the world have found it good business to provide such a wide variety of food and to spend huge sums of money in producing æsthetic effects in the presentation of their foods through the use of clean linens, attractive dishes, flowers, and other decorative effects which make an appeal to the appetite. Every means that may reasonably be employed to free one from fatigue and worry or that will produce good cheer, such as sociability, congenial friends, pleasant surroundings, should be used, for they aid digestion and so contribute not only to personal efficiency but also to general well-being and health.

EXPERIMENT III (CONCLUDED)

Problem 4. To ascertain certain important information in regard to your present habits of eating.

Method. From the data contained in the blank used in Experiment I (Form III) to determine how you spent your total time for one week, obtain the information needed to answer the following questions, recording the facts in such a way that they may be referred to or used at any future time:

1. How much time do you regularly spend at your meals each day? Is this sufficient to make conditions favorable for the mastication and proper digestion of your food?

2. Do you start your work immediately after a meal, or do you plan for a period of bodily and mental rest after each meal to aid the digestion of your food?

3. Do you ever try to save money on your board or meals? If so, is it a real or a false economy?

4. Do you live to eat, or eat to live more fully and happily?

5. If you eat at a cafeteria or any place where you select your own food, are you careful to select a well-balanced meal, one containing more vegetables and fruits than meats?

EXERCISES AND QUESTIONS ON THE TEXT

1. State nature's way of restoring the energy used in enjoyment and work. Discuss briefly the physiological and psychological necessity for sleep.

2. What is meant by depth of sleep? How is it measured? What is the relation between depth of sleep and the process of restoring the vital energy of the body?

3. Illustrate what is meant by an "evening" sleeper and a "morning" sleeper, pointing out the practical significance of knowing to which type you belong.

4. What is meant by artificially produced sleep? How do the results of such sleep differ from the effect produced by natural sleep?

5. What is the cause of dreams? What is their practical significance for the dreamer?

6. How do lower animals differ from man (1) in amount of sleep required? (2) in depth of sleep? How has sleep aided in the survival of the animal species that showed the most marked rhythms of sleep?

7. Upon what does the amount of sleep that an individual or a species requires depend? How much sleep do you personally require to keep yourself in first-class mental and physical condition? Give results obtained from performing Problems 1 and 2 of Experiment III.

8. (1) How may the fatigue produced by enjoyment and work be kept down to a minimum? (2) To what type of individual do you belong if measured by susceptibility to, and ability to recover from, fatigue? Of what value is it to the individual to know his power to resist and to recover from the effects of fatigue?

9. What are the most favorable conditions for inducing restful sleep and for going to sleep?

10. (1) In what ways are temperate eating and wholesome food related to personal efficiency? (2) What determines the amount of good that you get from the food you eat?

11. Report the results which you obtained by performing Problem 3 of Experiment III, and answer the questions asked in the text.

REFERENCES

- HOWELL, WILLIAM H. Textbook of Physiology (sixth edition), pp. 258-269, 933.
PATRICK, G. T. W., and GILBERT, J. A. University of Iowa Studies in Psychology, Vol. I (1897), pp. 40-61.
ROBINSON, E. S. and FLORENCE RICHARDSON. Readings in General Psychology. The University of Chicago Press, 1923.
SWIFT, E. J. Psychology and the Day's Work, chap. x. Charles Scribner's Sons, New York, 1919.

CHAPTER V

OTHER PHYSIOLOGICAL AND PSYCHOLOGICAL FACTORS WHICH CONDITION PERSONAL EFFICIENCY

Thus far in our discussion we have considered merely the basis for personal efficiency or the conservation and restoration of the energy used in study and other kinds of work. In this we have tried to show how one's supply of mental and physical energy may be conserved by relaxation, recreation, and play; how it is and must be restored if the most efficient work is to be done. But besides the factors already discussed, there are other principles which condition one's ability to release, to direct, and to use his available energy. These are important because they help him to make the best use of his available energy and powers in planning his time and his work. Those most important for our present purpose, because a knowledge of these laws will enable us to increase our personal effectiveness, are the following:

1. A group of factors affecting man's ability to release the energy used in his work, such as (1) initial and end spurts in efficiency or effort, (2) warming up, (3) incentives, (4) diurnal changes in one's ability to release and direct his energy, etc.

2. The influence of surroundings or of conditioning stimuli of every sort.

3. The need for novelty and excitement in human life and its practical significance for human efficiency in every field.

4. Natural versus artificial stimulation, and the effect on personal efficiency of narcotics, alcohol, drugs, tobacco, tea, coffee, and the like.

5. Certain native mental endowments that are essential for efficiency in all study or other work ; for example :

a. The individual's capacity for improvement ; that is, his sensory equipment, his general sensitivity, his degree of mental curiosity about things in general, his native store of mental energy, and the like.

b. His capacity for retention and recall.

c. His capacity for warming up, or the ability to get into the swing of his work quickly and effectively after a change has been made from one kind of work to another.

d. His span of mind, or the ability which he possesses to drive many things abreast while at work.

e. His ability to "sprint," or the power to call into play all his reserve energy when occasion or his task demands its full use.

f. His "vital capacity," or power to resist fatigue and to recover from the wearing effects of his work.

g. His general emotional type, which determines so largely the attitude he will take toward his work and the world.

h. His type of attention, or native and acquired habits of mind which enable him to concentrate on his tasks and work until they are finished, thereby correlating all his abilities and powers while at work.

i. His type of will, or the strength and character of his desires which alone enable him to finish his tasks and continue his work until the most successful way of attaining his purpose has been found.

j. His ability to form definite and reliable judgments about the things which come up in his study or other work, enabling him to direct his energy along right lines.

Some of these principles, notably 5, *f*, have already been treated in preceding chapters. Numbers 2 and 5, *i*, and 5, *j*, will be taken up in separate chapters because of their importance for the problem worked out in this book. The rest will be discussed below in so far as they affect one's ability to learn how to work in the most effective way.

1. SPECIAL FACTORS AFFECTING THE RELEASE OF HUMAN ENERGY AND THE OUTPUT OF WORK

Besides one's ideals or purposes and plans, one's interest in his tasks or general attitude toward his work and one's belief in its importance or practical value for him, a number of factors influence one's ability to release the energy used in his work and so affect directly the amount of work that can be done. Some of these factors have a direct influence upon the performance-curve and have been called (1) the initial spurt in efficiency or effort, (2) the end spurt, (3) diurnal fluctuations in efficiency during the day, and (4) warming up.

Initial and end spurts in efficiency or effort. The work-curve shown in Fig. 7, taken from Book's *Psychology of Skill*, is typical and illustrates the effect of three of these factors. In all short periods of work there is a high degree of effort put into the work during the first stages of the performance, followed by a decrease in efficiency. This initial increase in output is believed to be caused by the fact that more effort is put into the work at the start than afterwards, a fact which is popularly described by the proverb "A new broom sweeps clean."

This spurt in effort shows itself again, as the end of the working period is approached, in the increased efficiency which most work-curves show during the last few minutes of any period of continuous work. If the periods of work are relatively short, and if the worker knows that the work is to end at a certain time, this *initial* and *final* rise in efficiency is always present, showing that under the incentives operative during such periods of work the subject does not and perhaps cannot perform at the limit of his efficiency throughout the period of work (see Fig. 7).

Warming up. Of more significance, however, is the fact that most work-curves show a decided increase in efficiency after a certain preliminary period of work, during which time the activity is practiced at a maximum rate but slow enough

to insure correct performance and technic. In the performance of complex intellectual tasks this increased efficiency is probably due to the fact that the subject must adjust himself each day to the specific conditions of the task before he can attain his maximum speed. In work where large groups of muscles are used, as in racing or in most athletic events, the

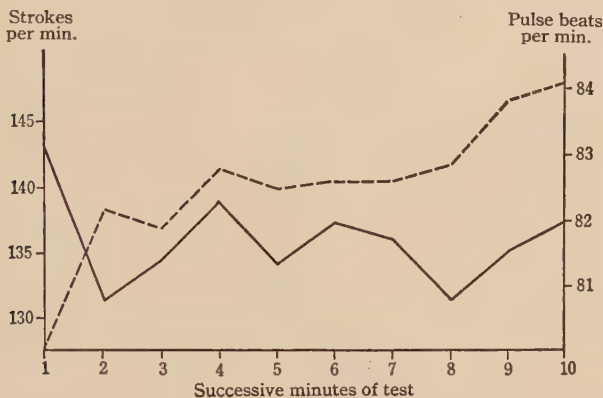


FIG. 7. Curves showing initial and final spurt in effort during continuous work

The solid line shows the average number of strokes made on a typewriter in successive minutes of all the tests taken for a period of 47 days when rapid improvement was being made in learning to typewrite. The dotted line represents the effort, or pulse, curve, which follows rather closely the general course of the performance-curve. (From Book's *Psychology of Skill*)

same process of adjustment seems to be required, and the early stages of the work may initiate glandular and circulatory activities that favor the release of the extra energy used. This is suggested by Book's work-and-pulse curves, which show that an increase in pulse rate regularly accompanies the marked increase in efficiency caused by the warming up¹ (compare Fig. 8).

Every athlete knows the value of such preliminary practice before he enters a race or a game. He must "get limbered up."

¹ W. F. Book, *The Psychology of Skill*, p. 173, Fig. 12.

Such warming up is no less necessary for effective mental work. If one should work fifteen minutes, then rest five, continuing to alternate his periods of work and rest in this way, he would probably lose more in warming up than he would gain by the rest. It would be far better to continue his efforts for forty or fifty minutes, then remain relaxed for five minutes at the end of this longer period of work, thereby utilizing the valuable effects of both the relaxation and the warming up.

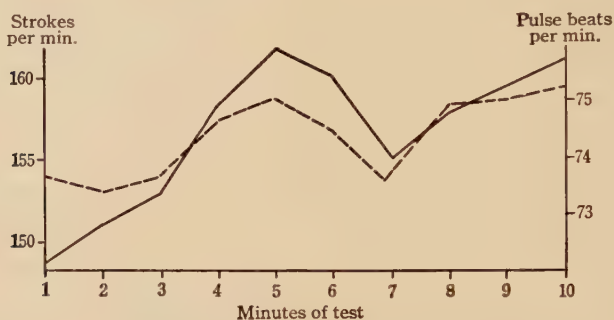


FIG. 8. Curves showing effect of the factor of warming up upon efficiency in performance

The solid line indicates the average amount of work done each successive minute for all the tests for 97 days. The dotted line represents the average pulse rate for each successive minute of all the tests. (From Book's *Psychology of Skill*)

Every efficient man plans his work in such a way that he can take full advantage of this principle of warming up to his task and at the same time conserve his energy to the greatest possible extent by taking the proper kind and amount of relaxation and rest. The right adaptation here is for the most part an individual matter which must be determined by experiment. Its relation to personal efficiency is evident.

Incentives. All tasks and work present certain factors which we call incentives. They may be ideas of the remote or the immediate value of the work, or merely an awareness of how the work is going or of the conditions under which the work is

being done. If the worker is rested and is succeeding with his task rather easily and well, there is a strong incentive to continue it, because it gives rise under such circumstances to keen pleasure or satisfaction; but if he cannot succeed or does not know what to do or how to do it, the opposite sort of incentive is sure to arise.

Professional ideals or definite purposes and plans may operate through many periods of work or even during a whole lifetime; other ideas or desires operate only for a very brief space of time, such as the desire for food at mealtime. Experiments have shown that children and men work better and produce greater results when there is a reward in sight or when they know that their records are to be published.¹ In certain cases the efficiency of workers has been increased simply by placing other more efficient workmen near them.²

This factor is particularly difficult of treatment, however, because there are as many possible incentives for work and for greater efficiency in work as there are human desires and fears, and the more vital these incentives are, the harder they are to work with under controlled conditions in a scientific experiment. The most important incentives for increasing personal efficiency in study and work will be discussed in Chapters VI and XVI.

Diurnal changes in one's ability to release and direct his energy. Experiments have also shown that an individual's efficiency varies during the course of the day. A careful study of the work of school children has shown that their capacity for intellectual work is high in the morning. Early in the after-

¹ See W. F. Book and Lee Norvelle's "The Will to Learn," in *Pedagogical Seminary* (December, 1922), pp. 305-362; H. D. Kitson's "A Study of the Output of Workers under a Particular Wage Incentive," in *University Journal of Business*, Vol. I (November, 1922), pp. 54-68; F. B. Knight and H. H. Remmers's "Fluctuations in Mental Production when Motivation is the Main Variable," in *Journal of Applied Psychology*, Vol. VII (September, 1923), pp. 209-223.

² W. D. Scott, *Increasing Human Efficiency in Business*, pp. 30-46.

noon there is a marked drop in their ability to work, followed by another rise and by a final falling off in ability to work late in the afternoon. Gates reports similar curves for college students.

Whether these diurnal variations in efficiency owe their existence to habits of work or to deep-seated organic and physiological rhythms that are partly native and partly acquired we cannot tell. Each individual should determine for himself his best periods for work and should plan his tasks in such a way that the most important things will be done when he is at his best, and the more routine and habitual tasks when his best energies cannot be so fully released or so effectively applied.

2. ARTIFICIAL INCENTIVES AND THE WORKER'S PERFORMANCE-CURVE

The effects produced upon individual efficiency by such artificial stimuli as alcohol, opiates, drugs, tobacco, coffee, and tea have been extensively studied.¹ Some of these drugs produce a temporary stimulating effect which gives the outward appearance of increased efficiency, and a feeling of fitness sometimes accompanies their use which strengthens the idea in the mind of the participant that their use is really helpful. But experiments have shown that each of these artificial means of stimulation really weakens the organism in varying amounts and so produces a decrease in personal efficiency rather than the reverse.

The desire for their initial use can perhaps best be explained on the basis of the organism's need for excitement or relief from the strains and stresses of life. Their continued use is explained by the law of habit and by the physiological effects which all

¹ For a brief summary of the effect produced by this group of stimuli see Hollingworth and Poffenberger's *Applied Psychology*, pp. 161-185. D. Appleton and Company, New York.

these drugs produce on the organism itself. All that need be said here about this group of artificial stimuli is that they decrease rather than increase an individual's real efficiency in study or work.

3. NEED FOR EXCITEMENT AND NOVELTY

The natural demand of the mind and organism for excitement and novelty is not generally understood. In an earlier section we discussed the necessity for a change in one's occupation or work.¹ Most work requires the use of voluntary attention and the exercise of the higher brain centers. This is very fatiguing. If the work is rather monotonous this condition, which is constantly pulling for a change of occupation, is greatly aggravated in all persons who possess a fertile and active mind, one that demands new and varied stimuli for its normal and complete functioning. For it is only through the use of such artificial stimuli that the unused parts of the brain are called into action. Those whose mental make-up is relatively simple do not experience in the midst of their work these constant demands for excitement and change. The latter are happy and satisfied when engaged in simple and routine tasks. But the more abundant health and the rested extra brain cells of a genius hunger for stimulation and for a chance to be exercised, as much as the stomach naturally craves food. Therefore persons who have an extra supply of mental energy need a greater variety of mental food. When this is not provided, their demand becomes a craving for excitement or for new and changing sensations which are likely to take an abnormal and very inefficient turn.

The best remedy for this natural craving for new mental experiences is to have one or more outside interests to occupy your mind *fully* when relieved of its routine tasks, or to be working at some original problem: to carry on some piece of

¹ Compare Chapter III, section 2, (3), pp. 63-68.

research in your specialty, or to have several important problems in mind in which you are vitally interested and concerning which you are collecting data. All this develops new connections in the brain, gives opportunity for the exercise of the unused parts of the nervous system, and prevents the dissipation of energy in the excitements to which this situation naturally and surely gives rise. In other words, if extra mental energy has been provided, it must be used; and unless you plan for its right direction and use, it will be dissipated on the many crazes which so often dominate the life of a young student or worker.

4. SOME NATIVE ENDOWMENTS THAT CONDITION PERSONAL EFFICIENCY IN STUDY AND OTHER WORK

A number of native capacities have a direct and vital bearing on personal efficiency in study or work. The more important of these should be briefly described and a few helpful suggestions made in regard to the attitude that a worker should take toward this mental equipment which he has inherited along with his supply of energy or capacity for physical and mental work.

Capacity for improvement. One of the most basic of the mental capacities conditioning personal efficiency in study and work is the ability to learn. All improvement, whether in general efficiency or in a special field, requires hard work. It requires a certain amount of application and a certain amount of determination to succeed in this type of learning. Certain difficulties must be overcome. Some will succeed in all these things better than others. Individuals differ also in their ability to profit by a given amount of instruction or practice and in their ability to find the best ways of learning the things that they need to know. Most persons get discouraged when the difficulties begin to pile up and when their improvement grows less or seems to have stopped. They turn to something

else and repeat the story all over again, making themselves "jacks" of many trades and masters of nothing.

Since personal efficiency in any line depends upon knowledge and training, the capacity for learning becomes a basic factor in producing it. The habit of investigating everything that is needed for success and of succeeding with everything one undertakes must be established. If this acquisition comes hard, this fact must be taken into account in making your plans.

The real basis for all learning is normal sense organs, through which all man's mental experience and knowledge comes. These should be accurately and regularly tested to make sure that there is no serious handicap in this direction; that you as a student are not subjecting your organism to unnecessary fatigue in order to make up for certain sensory defects that can and should be remedied by artificial means.

Native capacity for retention. Of equal importance with the ability to learn is the native capacity for retaining what has already been learned. The ability of different persons to acquire knowledge and skill varies tremendously; so also does their ability to retain the knowledge and skill that has been acquired. Ebbinghaus found by careful experimentation that he forgot, after a lapse of one hour, one third of all he had learned in a certain test. After a lapse of eight hours two thirds of all he had learned was forgotten, and after an interval of twenty-four hours he had forgotten about 75 per cent of what he had learned the previous day. Therefore an individual's progress in learning is not merely determined by the sum of the acquisitions which he makes from day to day, but by this sum minus what he actually forgets in the meantime. Much depends, therefore, upon how well you can retain what you have learned. This knowledge will be of great assistance in planning your work, because it will tell you how much and in what you should review.

Capacity for endurance and ability to recover from fatigue. These factors have already been considered in our discussion

of fatigue. But nothing is more important than to determine what you can stand and how much recreation and rest is needed to get yourself into first-class condition again for further work. In the physical and mechanical world we can determine accurately what a machine will do and about how long it will run. We should apply the same principle to ourselves. The mere feeling of fatigue will not suffice if you are anxious to do all the good in the world you can. It is at best only a poor measure of your vitality or strength.

People are inefficient from two causes : (1) Some abuse themselves by trying to work too much and so incapacitate themselves for their best achievements by wearing themselves out prematurely. (2) Others do not exert themselves enough and so do not get out of themselves as much as they are capable of doing. The first point was discussed in the preceding chapter. The second point will be treated in the three chapters which follow.

To ascertain the facts about yourself in both these respects and then to use this knowledge wisely in planning your work is one of the necessary steps in learning to be personally efficient in your work.

Rate of work and span of mind. Another important factor in personal efficiency is your rate of work. Some people work very rapidly ; others, slowly and laboriously. To what extent this is a matter of habit that can be corrected by education is not known. There is good evidence for believing that one can form a habit of mental slowness, or a habit of mental alertness which would enable him to turn things off rapidly and accurately with little or no extra fatigue. Something is also due to the methods of work which one has acquired. Some people read very slowly, one word at a time ; others can read a book of two hundred and fifty pages in two or three hours. Men like Carlyle could take in a whole page at a glance and do it well. Some persons have acquired a visual method of reading which enables them to read down the page instead of across it.

One of the factors of personal efficiency is to learn to work quickly as well as accurately. This is at bottom a matter of mental organization or span of mind. To learn to drive many things abreast is, therefore, one of the surest marks of efficiency. Rate of work is due to two things: (1) to one's method of work and (2) to mental quickness, including promptness in decision and execution. Both are vital for efficiency. It is the inhibitions and the lost motion caused by a lack of organization and by our indecisions that cause the greatest waste of both our energy and time.

The ability to sprint and to concentrate. Closely related to the matter of rate of work is the ability to sprint and the power to concentrate on a task until it is successfully completed.¹ There are times when one day or an hour of intense effort will yield greater returns in our work than a week of average effort. In fact, the greatest achievements in the world have been attained when men and women were thus working under strain. In these supreme moments all the other factors referred to above seem to be correlated and brought to bear on a definite problem or piece of work. This is the method of work used by a genius or an artist. And it has been demonstrated that all important insights in learning appear during these moments of supreme concentration and effort. It is extremely important, therefore, for one to learn to marshal all his powers when such occasions arise and to learn to bring all his powers to bear on the task in hand and to keep them there until it has been completed. At the same time, we must learn to plan our work so that we shall not overstep our bounds in the drafts which we make upon our store of available energy.

Attention type. Experiments have further shown that both aspects of the attention process can be cultivated: (1) the ability to select certain stimuli from the materials presented to the senses, and (2) the power to keep one's mind constantly applied to them until the problem is solved. There are, how-

¹ Additional help on both these points will be given in Chapter XXI.

ever, important individual differences in the power to attend that have a direct bearing on the individual's capacity for work. For some the range of attention is, either by habit or because of more basic hereditary causes, rather restricted; that is to say, certain persons exhibit a high degree of concentration but a limited range of attention. Such a limit in the number of things that can be mentally worked with at once usually indicates in adults great power of concentration. With this there usually goes a high degree of objective fidelity in observation or thought. Those so endowed or trained usually state only what they have definitely seen or heard. They avoid all guessing and conjecture. By reason of the sharp fixating of impressions they are said to possess a "fixating" type of attention. An extended range of attention may, on the other hand, result from a roving tendency that leads those endowed with this form of mental activity to supplement by conjecture, or by a mental elaboration of the meager impressions that were obtained by a hasty glance, what has actually been observed. This sort of individual is said to possess a "fluctuating" type of attention.

The type of attention which an individual has inherited or acquired has an important bearing, therefore, upon what he must do to make himself more efficient in the performance of his tasks.¹ These mental differences show themselves in any reading test and, according to Münsterberg,² have much to do with determining the occupation for which a given individual is best fitted. He says:

Two working men that are not only equally industrious and capable, but also equally attentive, may yet occupy two positions in which they are both complete failures because their attention type does not fit the work to be done, and both may become highly efficient as soon as they have exchanged positions. The one may

¹ Compare Chapter XXI.

² Hugo Münsterberg, *Psychology and Industrial Efficiency*, pp. 136-137.

be disposed to a strong concentration by which everything is inhibited which lies on the mental periphery; the other may have the talent for distributing his attention over a large field, while he is unable to hold it for a long period of time on one point. If one industrial activity demands the attentive observation of one little lever or one wheel at one point, while another demands that half a dozen machines be simultaneously supervised, all that is necessary for the highest type of success is to find a man with the right type of attention for each place. It would be utterly arbitrary to claim that the expansive type of attention is economically more or less valuable than the concentrated type.

In regard to all these capacities and endowments which an individual may possess, the important thing for personal efficiency is to determine by actual observation or test where you stand in regard to each, then to make the adjustment that is needed to obtain the best results in the things you want to do. Learning how to study or work in the most effective way is wholly an individual matter for two reasons: (1) The learner must in some way form and fix the specific habits that make him efficient. (2) His own peculiar heredity, talents, interests, and acquired habits of life must be constantly kept in mind, so that as the new and desirable habits of thought and work are being originated and fixed he may make the right adjustments to what he now has.

5. LEARNING TO KEEP A RECORD OF YOUR ADVANCEMENT IN LEARNING TO WORK EFFECTIVELY

One of the best means for stimulating effort and strengthening the will is to learn to keep an accurate record of your success in everything you undertake. As a practical exercise, therefore, in developing the habits that will enable you to work in a more effective way, you will here be given some suggestions on keeping accurate and reliable records of your success

in doing some of the specific things that must be done to learn how to work in the most effective way. Such records not only show how much progress you are making in doing each of the things that must be done to succeed in this type of learning, but will stimulate you to greater effort *when you succeed*, and show you, when you fail, that something more or something different must be done to make the necessary improvement. They will also show you when you have made sufficient improvement in a given direction to devote your time and attention to the establishment of other important habits. They will reveal when you cannot afford to take on any more load until some of the particular habits which you have undertaken to form have become firmly enough established to free your mind for the added thing.

New habits are very difficult to establish, as we shall show later, and one of the necessary means to success in learning to work effectively is to learn to form these habits one at a time and to know when you have really established a habit well enough to take up the development of another. The records which you are asked to keep throughout the book should therefore be kept very accurately and religiously. For everything fails if you do not carry out your purposes and plans. The best aid to gaining the necessary strength of will to enable you to carry out your purposes and plans about the improvements in your present methods of work is, therefore, to get the help that naturally comes from keeping an adequate and reliable record of your success with each habit or series of habits that you are trying to establish."

Keeping such a record will also prepare you for working at all your tasks in a truly scientific manner.

EXPERIMENT IV

Problem. To ascertain and record in some convenient form certain important information about your present methods of work, facts that may prove useful in making yourself more efficient.

Method 1. Ascertain from the results obtained in Experiment I how much time you now devote to your regular work and how much time you waste each day for a week. Record also the causes of this loss of time, and determine whether or not you are eliminating any or all of these sources of waste.

Method 2. Assemble the facts called for in Form IV and originally obtained by filling out Form III in Experiment I. Then determine whether these facts harmonize with the results you obtained in the various parts of Experiments II and III.

FORM IV. SAMPLE BLANK FOR RECORDING THE DATA OBTAINED
IN EXPERIMENT IV¹

SLEEP	MEALS	EXERCISE, RECREA- TION, PLAY	STUDY	LABORA- TORY	RECITA- TION	OUTSIDE WORK	TIME LOST OR WASTED	TOTAL AVAIL- ABLE TIME

Results. After assembling your data on each of these points and studying them carefully and conscientiously, answer the following questions :

1. To what extent do you have a regular plan of work for each day and for the week taken as a whole? What special arrangements could you make for a better utilization of your energy and time?

2. How much sleep do you require to keep yourself at the highest level of efficiency? Are you getting this necessary amount?

3. Do you give enough attention and time to your eating and meals to keep all the psychological and physiological conditions favorable for the proper digestion of your food?

4. How much time each day do you devote to recreation and play? How is this distributed during the day and week? Is it of the proper sort and of the right amount to keep your organism in the best of condition for effective work?

5. How much time did the data collected in Experiment I show that you were devoting to your regular work? Taking into account

¹ This table may be adapted to individual needs by changing the items listed here and adapting them to one's type of work. Record in hours and fractions of hours.

your native endowments and what you have determined about your fatigability, your need for recreation, proper food, and sleep, answer very carefully and conscientiously whether you are working too much or too little to get the most profit out of your life and work.

6. If a student in college, state in one sentence why you are attending college. Then consider this purpose carefully in order to ascertain whether it justifies the expenditure of four years of your life and an investment of about \$5000.

7. What definite plans have you made since beginning your study of personal efficiency to utilize more effectively your available energy and time?

EXERCISES AND QUESTIONS ON THE TEXT

1. What physiological factors other than fatigue condition human efficiency in learning and work?

2. Which three of these factors do you consider most important? Why?

3. Name and briefly explain the special factors that control one's ability to release his energy when engaged in study or other work.

4. What should one's attitude be toward these factors if he desires to make himself truly efficient?

5. What is meant by "warming up"? How is it related to personal efficiency?

6. What is the real significance and explanation of the desire for excitement in human life? What practical use may be made of this fact?

7. Name in a one-two-three order and *briefly* explain in your own words the more important capacities and native endowments that condition personal efficiency in study and other types of work.

8. Which of these factors do you regard as most important? Why?

9. Perform Experiment IV and answer all questions given in the text.

REFERENCES

- BOOK, W. F. *The Intelligence of High School Seniors*, chaps. i, iii, xiv-xvi. The Macmillan Company, New York, 1922.
- PATRICK, G. T. W. *The Psychology of Relaxation*. Houghton Mifflin Company, Boston, 1916.

CHAPTER VI

IDEALS AS AN AID TO THE RELEASE AND PROPER DIRECTION OF OUR ENERGY AND POWERS

As has already been shown, personal efficiency in study and in other types of work is conditioned by the amount of energy and health which an individual has at his disposal for enjoyment and work and by the way in which he is able to conserve and use this energy and time. But when one has learned to use all his energy and time in an economical way he has made only a beginning at making himself efficient, for this energy must be applied effectively to one's actual tasks before the desired results can be obtained. Moreover, it must be applied in doing only the right or necessary things. Most people have more energy than they know how to use effectively. In fact, most failures in life and the worst human inefficiencies are due to the fact that people do the wrong things. Hence it is extremely important to consider what makes an individual efficient in selecting the things he ought to do to make the highest type of success in his work. The next three chapters, therefore, will consider a group of *psychological* factors that enable an individual to use his powers efficiently in the performance of his tasks and in forming the ideals which serve as the directive forces in his life.

1. PRACTICAL SIGNIFICANCE OF AN IDEAL OR CLEARLY FORMULATED PLAN

An individual is stimulated to act because of three compulsions: (1) the stimuli or urges which come from surrounding objects, from his parents, from the laws of the land, from fashion, and from other demands of his time; (2) the com-

pulsions that come from within, from his heredity and personal habits, from his ideals and his purposes or plans; (3) the work which he does and the peculiar desires and fears to which it normally gives rise, generally called incentives.

Of these three possible sources of human reaction the two mentioned last are by far the most important for the purposes of this book. To be truly positive and efficient in our work most of our acts should be induced by the ideals and purposes which have been implanted into our personalities and lives as a result of our education and training, for these alone can serve as a directive force in our lives. They determine not only what we will do in specific instances but the general character of our responses and the attitude that we will assume toward our tasks. If proper ideals or purposes are combined with a genuine love for our work, so that we find our tasks highly interesting or more enjoyable than anything else in the world, a sure foundation for the highest efficiency is laid. But if one is lacking in proper ideals or in clearly defined purposes and plans and does not love his work better than anything else in the world, he becomes a prey to every passing stimulus that affects him and is driven about from one thing to the next like a ship adrift on the sea. With clearly defined purposes he not only builds up useful bodies of definite knowledge and experience, but has the power, through the exercise of these purposes and plans, to use such bits of knowledge and experience as will prove most useful in solving the specific problems which his duties and work present.

2. HOW A PURPOSE OR PLAN AFFECTS OUR ACTIONS AND THOUGHTS

The normal result of every impression made upon a living organism, whether the stimulus comes from within the organism or from without, is a movement or some other form of response. The movement may occur in the stimulated

sense organ, in the arms, the hands, the fingers, the legs, the feet, the head, the vocal organs, or in the internal organs, such as producing a changed action of the heart or of the blood vessels or of the lungs. The normal outcome of any thought or clearly formulated purpose or plan is therefore some form of response which is the biological purpose of the entire series of acts; namely, to get the organism properly adapted to the stimulus that has thus impressed it. It is also well to remember that no small part of this fundamental process of learning consists of becoming aware of the response itself. That is to say, the movement actually made may be recorded in the animal's experience, and this information be used in the future when it makes its responses to this same stimulus or to other stimuli.

In the performance of every task the ideas presented by one's imagination serve, therefore, as real directors to one's conduct as much as the external stimuli that have been arranged to set the whole matter going. Such inner tendencies or urges toward a definite response or toward a more or less clearly conceived goal may be temporary in effect or be effective only for a given task or performance. But they may, on the other hand, be very lasting and act as a permanent influence in one's life, giving direction not only to his present behavior but definite color and form to the attitudes and moods which affect all his responses for long periods of time, sometimes during the rest of his life, as any careful study of the biographies of the men and women who have done the most important work in the world will abundantly show.

3. THE RÔLE PLAYED BY CLEARLY DEFINED PURPOSES AND PLANS

To obtain the most effective results a worker should therefore always have in mind a specific problem or aim which constitutes the true goal of his study or work. That is to say,

he should have clearly in mind just what he desires to accomplish by means of his reading or study and carry on all his work under the guiding influence of this *clearly defined purpose*.

This aim should come as far as possible from the student himself, since the more strongly *he* desires it the more effectively will he be able to work. His purpose or problem should also be as specific and concrete as possible, because half his troubles are over if he sees clearly just what he is trying to do. If this be definite and clear, he has only one problem to solve, namely, to find a way of doing the desirable thing; but if his goal is not clearly defined in his own mind, he is in no position to find the best way of attaining it, because he does not know what it is that he seeks.

All efficient students and the most successful workers in every field continually set up for themselves such specific purposes for all their study or work. For example, a scientist who works effectively always starts with a definite hypothesis or a carefully stated problem. He next collects and carefully organizes all the facts that bear directly on this particular problem, and labels these facts his results. He then tries to judge, from previous experience and the knowledge already obtained and verified, what these facts mean, endeavoring to explain them in the light of what is already known. Lastly, he draws such conclusions as are warranted by the facts, and considers the probable application of the facts he has discovered in his own and in other related fields, realizing, as he must, that all knowledge is relative and that his own conclusions can be only tentative at best.

Such a procedure is absolutely necessary for the discovery of new truths in every science and must be used by all workers if the most efficient results are to be attained. The problem of learning how to formulate and to execute such a definite purpose or plan will be fully discussed in Part III of this book.

(1) Kinds of Purposes which a Student or a Worker may Have

Many different kinds of aims may, of course, serve as the dominant purpose for a worker in the performance of his tasks. (1) A student's purpose might first of all be one of utility, such as examining a college catalogue to see how many credits are required for graduation and what specific subjects he is required to take; or he might study psychology with the avowed purpose of getting help for improving his memory or for learning how to study in a more effective way. (2) His purpose might, on the other hand, be more intellectual or general, such as examining Wordsworth's poem "Tintern Abbey" with a view to convincing his teacher of its excellence, or studying the life of William Wordsworth with a view to determining the real cause of his greatness or why he was able to write such a poem as this. (3) His purpose might, however, be of an entirely different sort, as was the case with one of the author's students who tutored a blind girl in psychology. This student studied her psychology with a view to reading it to her blind friend and discussing it with her. In the same way one might study the stories of the Bible with a view to telling them to small children. But in any case the real aim should be definite and clear; the more clearly it is defined, and the more strongly it is desired by the student or the worker, the more efficient will be his responses in its behalf.

(2) Ways in which such a Purpose may aid a Student in his Work

There are many ways in which such specific purposes may aid a student in his work. They serve, in the first place, as a means for providing real psychological motive power. Study is hard work. Something is needed to stimulate the student to greater endeavor. This the purpose really does if it comes from the worker himself or if it represents something which he

personally desires or feels that he needs. Not only will it then serve to direct his energies and efforts into the right channel, it will act as an *inner urge* causing him to persist in his efforts in the face of all the difficulties that normally arise in every instance of work.

Secondly, the aim of the student also serves as a basis for the selection and organization of the facts that are being ascertained from references or by observation and experiment. Facts that bear no important relation to one's purpose or problem are discarded; those selected may be arranged in a logical sequence instead of being handled as a meaningless mass of details.

Finally, the problem also holds out to the learner and the worker a real promise that the information gained will be used; that there will be some practical outcome to his study or work; in other words, the problem helps the student to turn his knowledge to some account. This is psychologically necessary, because learning implies expression as well as impression. Every act of learning requires, in the first place, that a stimulus of some sort be applied, one that will produce the desired result. If this process is repeated often enough, it so changes the organism of the learner that for him this particular situation will in the future be linked to this specific response. Nor is this all. The making of the response or the use of the information obtained is also taken account of by the learner, because he is made aware of all the responses that he makes, as is shown by the dotted line *cb* in Fig. 9. This awareness of what he has done not only enables a worker to correct the responses he makes, but also enlarges his experience through the very performance itself, which is not merely the end-result of the process but an important avenue for further learning. This principle or law also helps us to understand why it is desirable, even necessary, for a student to *use* all the knowledge he has acquired or is attempting to acquire.

The aim of every study process, therefore, should be to use

all the ideas and facts which the student obtains in his work. In the case of much of a student's work this end-result is not always clear, but facility in the use of what is being learned is the only proof we have that a thing has actually been learned. The steps or stages in the mental assimilation which enables a student to use what he has learned are therefore much the same as those used by a successful scientist:¹ (1) the collection of crude materials, or the facts furnished by some author or lecturer or secured from observation and experiment; (2) the selection, arrangement, organization, and evaluation of these materials and facts; (3) making this sifted and organized knowledge a part of the student's own experience through its application and use.

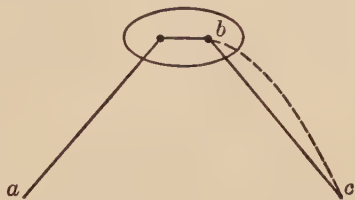


FIG. 9. Part played by the response in acquisition

a is the application of the stimulus, *b* the impression and transformation of the sensory impulse into a motor impulse, *c* the response. The dotted line *cb* indicates the impression and transformation of the kinæsthetic sensations aroused by the response

(3) *Importance of the Attitude and Reactions of the Learner*

A student should therefore learn to make some contribution to the facts which he observes and collects. He must react to the author he reads and to the facts he observes, and he must learn how to judge the relative worth of the data he collects. This is a necessary precondition for the proper assimilation and use of these facts. For no author or lecturer can or should "tell it all," and true learning can take place only through the reactions of the learners themselves.

While a student is studying or investigating any problem or question, he should therefore keep an open mind for every-

¹ Compare pages 111 and 112 of this chapter.

thing that is new and be ever ready to make any needed change or addition to what has already been learned, even while he holds fast to what he has learned until such a time as he finds that his former ideas are inadequate, incomplete, or wrong. In other words, he should assume a physician's attitude toward his tasks, always keeping an open mind toward both the old and the new.

(4) Proper Organization of the Facts

The facts collected on any problem studied by reading, by observation, or by experiment may, of course, be organized on several different bases, and the matter of judging the soundness and general worth of the statements read or the facts obtained constitutes the most important and the most difficult single problem that a student or a worker meets. The key to the situation is to select the most important or dominant ideas. These will point the way for the organization. And here, again, the student's purpose or aim, if clearly perceived, gives the most helpful basis for deciding what is really important and pertinent to his purpose and what is clearly beside the point. The best aid for making correct and helpful judgments is to keep clearly in mind the true purpose of his study or work.

4. FOUR KINDS OF IDEALS WHICH A SUCCESSFUL WORKER MUST HAVE

Four kinds of ideals should be held by an individual desiring to learn to work in the most effective way: (1) his immediate purposes or specific plans for his work or for a particular task, such as have already been described in section 3 above; (2) definite plans for the immediate future, for the day, the week, the term, or one's college course, or for the next three or four years' work; (3) one's life ideals and purposes; (4) the ideals and beliefs that we hold about the ultimate future. The first type has already been partly

discussed and will be further treated in Chapters XI and XII, where special directions are given for the analysis of specific tasks. The other three types of purposes will be described below and their significance for learning to work be effectively pointed out.

Immediate ideals and purposes. These include one's plans about the specific things he must do today, this week, this term, and so on. The more clearly and definitely these purposes are determined and the more consistently they are kept in mind as you work, the better will you be able to do your work in the most effective way. Of course these purposes or plans must be correct, and the more specific and definite they are the better will the work be done.

Life ideals and purposes. Each student and worker should, in addition to these immediate purposes, make definite plans for his life work taken as a whole. These larger purposes, if definite and clear, serve as the directive forces in the worker's life, and all his immediate purposes or ideals should be mere steps or stages in the realization of these *larger* plans. One's immediate purposes must in no case be in conflict with these larger and more important plans, for which the immediate aims are only a necessary means. The chief need for these larger purposes and plans is, therefore, to aid in the selection of our more immediate ideals or plans, and the latter are really part and parcel of the larger plan, for they represent the things that must be done to attain the more constant purposes that we have in mind, or should have in mind, if we desire to make our daily work truly efficient and cumulative toward attaining our life's desires.

Ideals about the ultimate future. The ideas which a student or a worker holds about the ultimate purpose of human life in the world, about the destiny of man and his relation to the rest of the universe, also have an important *practical* effect not only on his general attitude and conduct in the world but on the way he goes about his daily tasks and consequently

on his personal efficiency in any field. The general attitude which an individual takes toward the universe and toward his fellow man gives meaning, direction, and worth to his life purposes and aims, and his life purposes, in turn, control the selection of the more immediate purposes and tasks which make up his daily life and which constitute the actual steps that must be taken to achieve the larger and more distant goals toward which he strives.

Efficiency demands that there be no conflict between these different types of ideals. For one's present daily and routine tasks he should draw strength and direction from his life purposes and plans, and his life purposes and plans take their meaning and significance from the ideas which one holds in regard to the ultimate meaning and purpose of human life, or from the attitude which man takes toward humanity and the universe as a whole.

5. ADJUSTMENT TO THE THREE FUTURES IN WHICH THESE IDEALS MUST OPERATE

To be truly efficient a student or a worker must therefore make a suitable adjustment to three futures: first, to his present task and to the scores of distracting stimuli that naturally tend to call him away from his work. This distracting present with its constant and ever-growing demands on the worker constitutes one of the most critical situations which he meets. Without a clearly defined ideal or purpose that extends at least into the *near* future, such as the desire to finish the present task or his college course, any student or worker will become a victim of the ever-changing stimuli that surround him and be unable to concentrate on his tasks or to finish the work that he undertakes.

Some workers, instead of meeting their tasks squarely and courageously as they come and determining what must be done to find the necessary means for their performance, take

solace in the ultimate future and in contemplating the eternal justice and fitness of things, believing that everything will come out all right, anyway, no matter what they do or how they work. This attitude and type of adjustment are well illustrated by the philosophy of life which tramps and many inefficient people in all walks of life hold and live by. They believe they will die when their time comes to die, and not before. They believe that everything will turn out all right with them and the world, no matter what they do. They do not see that the most desirable things of life must be carefully planned for in advance and the necessary steps be taken for their attainment before they can really be obtained. Such blind faith in the ultimate future is just as fatal to efficiency as it is to become overpowered by the stimuli that the immediate present provides.

For achieving the greatest efficiency in our work it is helpful, therefore, to fix one's mind on the near future, on what one desires to do in the next four, ten, or twenty-five years. This frees one to a certain extent from the surging and distracting present with its masses of obligations, its many desires, and its bewildering demands. It also saves one from fixing his mind too firmly on that "far-off divine event, to which the whole creation moves" and so expending most of his time and energy in dreaming about *that* when certain definite *steps should be planned for and taken* to get him a little nearer the specific things he most desires. One should therefore plan to keep his mind fixed on what should be done in the next twenty-five years and on the actual possibilities that are *now* and *here* open to everyone, within the period of his *own individual life*, for this is the surest way to make a proper adjustment to the bewildering present and at the same time to prevent the useless dreaming about the ultimate future described above, which always results in mere wishing, leaving the dreamer wholly inefficient and hopelessly drifting on life's tumultuous sea.

6. PROPER COÖRDINATION OF ALL YOUR PURPOSES AND PLANS

There must, therefore, be a proper coördination between all these ideals. And it is just here that one's life purposes and his beliefs about man's ultimate place and work in the world come to function in a very practical way. If there are no life and ultimate purposes to coördinate one's lesser or more immediate purposes and plans, we shall have a situation in the individual's life analogous to a factory where there are no definite plans to determine its organization or what each particular department of the industry shall do. If each division is working toward a different goal, there can be no unity of purpose, efficiency, or success.

This is why every man and woman now living or dead who has made any important contribution to human achievement in any line of work has been an idealist. Their larger ideals and visions served to bring together their smaller purposes, and their more immediate plans enabled them to use these smaller purposes as stepping-stones toward the realization of their larger aims. In every case where efficiency and success are desired these smaller and immediate tasks and plans must be brought into proper rapport with these larger aims, that is, made the necessary steps to their realization.

It is unnecessary to give examples of where such definite ideals have contributed to the highest human efficiency in every field. We need only recall the most noted examples of the successful men and women who have lived in the past: the Hebrew prophets, the best statesmen, the leading artists, scientists, inventors, musicians, and the like, or to become better acquainted with the men and women who are doing the most important work in the world today. All are dominated by lofty purposes or ideals which serve as directive forces in their lives.

On the other hand, many human failures among students and workers are due to the fact that they are leading aimless

lives. If properly managed and directed by others, some of these drifters will succeed in doing certain things fairly well, but they are *imitators* at best and can never get anywhere on their own account because they are not headed toward any specific goal. They must always be directed by someone else, and are the prey of the stimuli that affect them from without.

7. EFFECT OF A PERVERSE OR WRONG IDEAL

All that has been said about the importance of *correct* or helpful ideals applies in a negative way to the effect which a *perverse* or *wrong* ideal will have upon the life and conduct of its possessor. Among such perverse ideals which often work such havoc with the success of scores of individuals may be mentioned the following: (1) students in college getting the idea that they must first of all have a good time; (2) the case of a young student becoming so discouraged with his efforts and his outlook on life that he committed suicide on Christmas day; (3) the case of a crippled soldier who got the idea firmly implanted in his mind that life held nothing further for him. Here as in all other cases the ideal leads the way, determines what reactions the individual will make, determines his attitude toward his work and the world, and so decides the direction in which his energies will be applied. Such an individual is worth absolutely nothing to himself or to the world until his aim in life is completely changed.

8. NORMAL EFFECT OF VAGUE IDEALS OR ACTION WITHOUT ANY CONTROLLING PURPOSE OR PLAN

Impulsive or aimless action is as bad or *worse* than acting in response to a wrong ideal, because wrong ideals may be corrected and a new goal set up. But an impulsive or aimless actor, on the other hand, lacks consistency and determination along with the power to steer himself. His brain has become scrambled, as it were, while his life runs along as free from purposes

and design as a crazy quilt. He is always moving but never gets anywhere, because he is not headed toward any particular goal. He can never become efficient or reliable because there is no accumulation from his efforts along any one line. Such individuals usually believe in fate instead of in training and skill, and expect their own ingenuity to take care of them. The best they can do is to follow someone else who does have a definite ideal or plan.

It may be concluded therefore that correct and clearly defined ideals or definite purposes and plans constitute the first necessary prerequisite to personal efficiency in every field and that the first necessary step toward success in any line of work is to know exactly what you want or have to do. Unless this be definitely known you can scarcely expect to be able to find the best ways of doing this particular thing or of obtaining what you most desire.

9. HOW PROPER IDEALS OR RIGHT PURPOSES AND PLANS ARE ACQUIRED

Since ideals play such an important practical rôle in determining human efficiency in study and other types of work, it is important to learn how they may be acquired by an individual who desires to make himself more efficient.

Immediate purposes. Your immediate purposes and plans, which should guide you in the performance of your specific tasks, must be obtained from an analysis of your tasks and work and from the knowledge and skill which you have acquired in the process of education and training, including the ability to use this knowledge and experience in selecting the best means for attaining your highest desires. This point will be fully discussed in Chapter XI dealing with the analysis of one's tasks and the standardization of methods of work.

Life ideals. One's ideas about the ultimate meaning or purpose of human life are derived from many sources. The world

in general has secured its ideals from geniuses. One such leader or a group of such leaders regularly serves as the inspiration of a whole country or for the whole world for many years. Just as the manager of a business or industry provides the ideals and leadership for the entire business, so individuals formulate in literature, philosophy, religion, science, etc. the ideals of a whole people or for a whole epoch in the history of the world. It is therefore advisable in the search for right ideals to study the lives of the leaders in your own field of work and to try to catch step with them.

Sometimes a set of seemingly accidental circumstances produces such leaders or makes conditions favorable enough for their development. Just how they got their purposes or how correct ideals are developed within an individual life is not definitely known. The following sources are most helpful for acquiring the best ideals for one's life and work :

1. The examples and work of the best men and women in the world today. Coming in contact with those who have the vision and the courage to strive and work for what they see, then catching step with them. This will generally give a right direction to your efforts and thoughts.

2. The biographies of the great men and women who have lived and worked in the past and who have had ideals and interests similar to what are believed to be best today.

3. The best and most serviceable ideals often come from a contemplation and study of nature and from a study of the larger and more permanent things in the universe. Direct communication with nature and the contemplation of her laws will give to an individual the larger purposes that are required for doing the most successful work in life. The best things in life and in the world have always come from the ideal or unseen side of things, never from the material or purely utilitarian side. Mere efficiency on the material side, therefore, will not make an individual truly efficient. Proper ideals are necessary even for attaining the greatest worldly success.

10. MEASURING THE PRACTICAL VALUE OF A DEFINITE PURPOSE OR PLAN

As an exercise to determine the power of a purpose in the ordinary affairs of life, try the following experiment :

EXPERIMENT V

Problem 1. To measure the practical value of a clearly defined purpose or plan.

Method a. Walk aimlessly down a crowded walk between two college buildings some morning between recitation periods, or down a crowded street, with no particular destination in mind. Note carefully to what extent and in what ways other people impede your progress. Observe and describe exactly how you found your way through the crowd. Next turn and walk back, or try the experiment on another day, this time with a fixed destination in mind. You need not hurry or scramble, but looking neither to the right nor to the left, walk steadily toward your chosen destination. Watch carefully and record what happens in each case. Then answer the following questions :

1. How long did it take you to make the trip in each instance?
2. Did your observations show that other people impeded your progress more in the first instance than in the second?
3. Did you in the first test turn and twist like a stream meandering through a meadow as you threaded your way through the crowd?
4. Did the people seem, in the second test, to get out of your way more than they did in the first? In other words, did your experiment bear out the truth of the saying "The world steps aside to let the man pass who knows where he is going"?
5. Did your path or course actually straighten out in the second test?

6. What conclusions can you safely draw from your results?

Method b. Take a half-hour's walk some day with no particular purpose in mind except just to walk ; note and write down all the mental and physical effects which such a walk produces on you, so far as you can observe them. The following day at about the same time or on another day take another walk with some *definite*

object in view, noting, as before, all the physical and mental reactions that each experiment produced.

1. Did the time seem to pass more quickly and pleasantly in the second case?

2. What differences do you note in the way this bit of exercise makes you feel mentally and physically?

3. What conclusions do you draw from this experiment in regard to the psychological and physical effects produced by a definite ideal or purpose?

One of the practical principles conditioning personal efficiency enumerated and discussed in Chapter XIII is "working out a set of written practice instructions" for every important thing that one has to do and for our work as a whole — a written plan of procedure that will tell one exactly how he should proceed in doing his work.

One of the best practical exercises in connection with a study of ideals, therefore, would be for the reader to hold an earnest session with himself for the purpose of making definite and clear in his own mind just what his purposes or life ideals really are.

Problem 2. As a second problem in this experiment you should therefore try to formulate for yourself your major or life ideal or purpose.

If you have never thought of it before or only slightly, it will be impossible for you to evolve a satisfactory statement in five minutes, an hour, or even in a day. Only a few men and women formulate clearly and definitely in early life their life ideal, and if they do they generally work on it for years. But this is no reason why you should not formulate some attractive major ideal and follow it until you get further insight in this respect.

Problem 3. When you have fully determined upon your life or major ideal and have written it out definitely and in as much detail as possible, you should try to enumerate in writing your minor ideals or the steps that must be taken to attain them, taking special care to see that they are all essential for getting you where you desire to go. The more fully and carefully you determine upon these minor ideals in all the elements of your life and work the more surely and quickly will your major ideal be realized.

Problem 4. When you have written out your life or major ideal and the minor ideals which must be used to attain it, do the same

for your more important avocational aims. If any of these is hostile to your major purpose in life, the very fact of writing them out and studying them will reveal this fact and so enable you to eliminate it at once.

This part of the experiment is for your own use and need not be recorded in the text, but you may get help and suggestions for solving Problems 3 and 4 if you desire.

If you give such special attention to your purposes and plans, your ideals will soon begin to direct all your actions and thoughts, arouse new feelings of ambition and aspiration, and so provide the powerful elements of interest and enthusiasm which will organize all your thoughts and efforts and direct them toward the ends which you really desire to attain.

EXERCISES AND QUESTIONS ON THE TEXT

1. What do you regard as the most basic principle controlling personal efficiency in every field? Why do you select this in preference to all others?

2. Name and briefly explain the three types of ideals that every individual should have.

3. Explain how an ideal or purpose normally operates in controlling human actions and thought. Explain how such an ideal or purpose may aid one in his work.

4. What rôle is played by a clearly defined purpose or aim in the study of a lesson, such as mastering the content of this chapter?

5. State in your own words and illustrate what a conflict between one's immediate, one's life, and one's ultimate ideals or purposes means (1) for efficiency in one's own individual life, (2) for efficiency in business and industry.

6. What three futures does every person face? What adjustment should one try to make to each?

7. Give one or more examples from your own observation and experience to illustrate a perverse or wrong ideal or purpose (1) in an individual's own personal life, (2) in a business or school organization.

8. Which is worse: to be controlled and directed by a perverse or wrong ideal, or to possess only vague and indefinite ideals and purposes? Give reasons for your answer.

9. How are ideals and purposes acquired (1) by an individual? (2) by a nation?

10. Work out Problem 1 of Experiment V as directed in the text and file your results for future reference and use.

11. Work out in a similar way Problems 2, 3, and 4 and keep for your own information and use your results on this part of the experiment.

REFERENCES

- CARR, HARVEY A. *Psychology, A Study of Mental Activity*, chap. viii. Longmans, Green & Co., New York, 1925.
- DEWEY, JOHN. *Democracy and Education*, chap. iii ("Education as Direction"). The Macmillan Company, New York, 1924.
- JUDD, CHARLES HUBBARD. *Psychology*, chap. vii. Ginn and Company, Boston, 1917.
- SWIFT, EDGAR JAMES. *Mind in the Making*, chap. x ("Man's Educational Reconstruction of Nature"). Charles Scribner's Sons, New York, 1909.
- VAN DYKE, HENRY. *Ships and Havens*.
- WOODWORTH, R. S. *Psychology*, chaps. xi and xx. Henry Holt and Company, New York, 1921.

CHAPTER VII

THE DEVELOPMENT AND USE OF ATTENTION AND WILL

1. RELATION BETWEEN PERSONAL EFFICIENCY AND THE WILL TO DO

Personal efficiency in study and work is dependent upon four things, as has already been shown: (1) upon the amount of energy and health at your disposal for use in your work; (2) upon the character of the ideals and plans which determine whether your efforts and energies will be applied in the right direction; (3) upon the strength of your desires or whether you are able to use *all* your abilities and powers in the performance of your tasks; and (4) upon the extent to which you are able to apply your energy and time in the most effective way to the particular tasks that must be performed to get you where you want to go. The first two of these elements have already been discussed. The fourth, which will be treated in Parts III and IV of this book, deals with the ultimate *test* for personal efficiency in every type of work. For it is easy to see that the final test of personal efficiency in every field is whether a given individual has learned to *use* his energy and time in the most effective way in doing the particular things which he is compelled to do to attain success in whatever he undertakes.

To be truly efficient you must therefore have enough determination and persistence to carry out all your purposes and plans, or the ability to stay with and finish whatever you undertake. All fails if your purposes and plans are not properly conceived or not desired strongly and constantly enough to make you persist in your efforts until a way is found to do

the specific things that must be done to attain the desired results. The need for persistence in carrying out our purposes and plans is therefore self-evident. All fails if we quit before the desired goal is reached or if our purposes are shifted as soon as the road becomes difficult to traverse. Most persons fail to do all that they can. They use only a small part of the energy and mental powers which they possess. It is the chief purpose of this and the following chapter to give students and workers a type of help that will enable them to tap some of these hidden stores of available energy and to show them how to use it more effectively in attaining what they most desire.

2. FAILURE TO DO ALL THAT WE CAN

Two of the chief causes of inefficiency in study and work are (1) the inability to finish a task because we do not persist when things become disagreeable and hard; (2) the failure to do all that we can, or the best that could be done under the circumstances.

In Chapters III and IV the possible extent of our powers was considered and attention called to the importance of conserving our total supply of available energy. Suggestions were also given on learning how to use it in the most economical way. These factors of safety are very important and basic for personal efficiency in every field. But what is more important than the conservation of our available energy and power, the thing that makes such conservation desirable, is to be able to open up a way of approach to these latent powers, so that these stores of available energy may be released on call. To be truly efficient our energy must be used to carry out our purposes and plans. We should, therefore, know not only the extent or limit of our available energy and power but also the best ways of tapping these energy reserves when confronted by our tasks. Any individual "who energizes below his normal **maximum** fails by just so much to profit by his chances in life."

3. HOW THESE HIDDEN STORES OF HUMAN ENERGY ARE RELEASED

Many workers make it a practice to stop their work as soon as they meet the first effective layer of fatigue. Others stop when the task for any reason becomes disagreeable or difficult. But as was earlier pointed out, if necessity forces one to press onward when these first feelings of fatigue appear, a surprising thing happens. The fatigue gets worse up to a certain point, then gradually or suddenly passes away, leaving one seemingly fresher and more able to work than before. It is believed that under such circumstances a level of new energy has been tapped, masked until then by the feeling of fatigue which we usually obey. In this way an individual may find beyond the very extremity of fatigue-distress a second, third, or even fourth wind, characterized by amounts of ease and power that most persons do not know they possess.

James believed that these hidden sources of strength — habitually not used at all, because habitually we never push through these fatigue-obstructions — represented reserves of energy that should be called into use, deeper and deeper layers of energy that might safely be used by an individual so long as decent hygienic conditions are preserved. He believed that the organism would adapt itself to these higher levels of energizing without injury, if required to do so, by providing better means for recuperation, and quotes as evidence the results obtained by Professor Patrick, who kept three students awake four days and nights and found that when he permitted them to sleep themselves out they became completely refreshed with only one third more sleep than they usually took for their normal rest. He says :

As a rule men habitually use only a small part of the powers which they actually possess and which they might use under appropriate conditions. The human individual usually lives far within his limits ; he possesses powers of various sorts which he habitually

fails to use. He energizes below his maximum, and behaves below his optimum. In elementary faculty, in coördination, in power of inhibition and control, in every conceivable way, his life is contracted like the field of vision of an hysterical subject — but with less excuse, for the poor hysteric is diseased, while in the rest of us it is only an inveterate habit — the habit of inferiority to our full self — that is bad.

In another place he adds :

Compared with what we ought to be, we are only half awake. Our fires are damped, our draughts are checked. We are making use of only a small part of our possible mental and physical resources.

He believed that this charge of being inferior to their full best self is far truer of some individuals than of others and gives as his remedy for "going over the top" some unusual stimulus which will fill them with emotional excitement, or an important idea or purpose that will induce them to make an extra effort of will. These carry them "over the dam" on to a higher plane of efficiency marked by clearness in discernment, greater sureness in reasoning, and greater promptness and firmness in the decisions and judgments which they are called upon to make.

That certain ideas and deep-set convictions are potent forces in life for releasing our available energy is a matter of common observation.¹ It is shown by the biographies of most successful

¹ Nothing that is said in this and the following chapter on "Types of Decision and Fatigue of Will" should be interpreted by the reader as implying that the individual has complete control over his environment or can control and direct his actions by a sheer act of will. As will be pointed out in the next section of this chapter, there is no such known force in human life. The inner tendencies to reaction which we inherit and the social and external conditions under which we must live and work both help to determine what any individual can and will do. We have nowhere in this book attempted to set forth the true relationship between these inner and outer factors which operate in individual development and learning. All that is attempted is to set forth the more important factors which operate in a practical way in producing the progress that is made in this type of learning, with the hope that a clear statement of these facts would be of some assistance to all who desire to make themselves more efficient in their work.

men and women both living and dead. But the usual way of expressing it is to say that it is a matter of will, that it depends upon the will-to-do, which brings us round to a consideration of the chief problem of this chapter; namely, what this will-to-do really is and how it may best be cultivated and conserved.

4. TRUE MEANING AND FUNCTION OF "WILL"

The word "will" has been used in two different senses: First, to signify some phenomenon or power which is supposed to exist somewhere in the organism and which produces a response of the organism or of some of its parts. This doctrine was long ago exploded by the discovery of the phenomenon of reflex action, in which sensible impressions, as everyone knows, produce movements immediately and of themselves. There is no scientific evidence whatever for believing in the existence of such a power or force within the organism.

A second and more modern and correct view of "will" makes it identical with the individual's control of attention or his control over the process of selection which goes on among all external and internal stimuli that affect the organism during its waking or conscious life. According to this view the will-to-do a given thing consists merely of attending to this thing long enough for the act to follow, if it has been learned or done before. If it has never been done, it cannot be willed. In ordinary life and experience the act follows directly upon the appropriate idea, to which it has by heredity or training been linked. The natural outcome or end-result of all mental processes is movement. As a matter of fact, there is no sort of consciousness whatever, be it sensation, feeling, or idea, that does not directly and of itself tend to discharge into some definite response. Any perception, idea, conscious purpose, or desire to do a certain thing leads, therefore, directly to its performance if it has been learned or done before. If not, it leads just as directly and inevitably to other responses that

can be made, and that give some promise of serving as a means for originating the desired response.

What the will really is and does can, therefore, best be expressed by explaining its relation to the voluntary responses which an animal is supposed to initiate and control. All activity of the organism starts with, and originally consisted of, the responses that are directly linked to particular situations or stimuli by inherited structure or by the connections in the nervous system that make up a part of the animal's inherited equipment; for example, blinking the eyes, avoiding all stimuli causing pain, etc. All the animal's voluntary activity or the acts that are under the control of his will are in reality acquired modes of behavior and are developed from and by means of the reflex and instinctive movements which the animal does not need to learn to master. All sensations, ideas, desires, emotions, and definitely formulated purposes or plans lead directly to some sort of action. But the response that has been linked by heredity or by previous learning to a given stimulus may be inhibited by another tendency to respond that is just as firmly linked to some *other* stimulus that may be occupying the focus of attention immediately before or after the first one has been acted upon. *Voluntary action is, therefore, at all times a resultant of the compounding of our compulsions with the inhibitions* to which other stimuli and thoughts attended to quite naturally give rise.

Moreover, the thought or performance of an act naturally calls up its opposite by the action of the law of habit. Yet the fact that these opposites swerve back and forth in our mind does not mean that one is really free to choose whichever he will. Other things besides voluntary choice determine which of these ideas or stimuli will remain in the focus of attention long enough to produce the appropriate action and so determine which of the possible responses will be made. In all such cases we perform that act of a given pair or series of acts which gets most attention or for which we have the strongest in-

stinctive or habitual bias or for which we have the strongest stimulus at that particular time.¹

The process of willing, therefore, becomes one of holding fast to the idea or purpose or stimulus that is appropriate for the result that one wishes to obtain and that normally leads to the desired result if firmly and continuously enough held in the focus of the mind. And the training of the will becomes a matter of training the attention and emotions, or of learning to think the right thoughts, and holding the correct ideas clearly and continuously in mind. This naturally and inevitably leads to the act which one wishes to perform. To train the will or to develop determination and persistence means, therefore, the development of certain habits of attention and thought that bring, as a matter of course, the reaction desired. The rest of the chapter should, therefore, be devoted to an explanation of how this may best be done.

5. THE CULTIVATION AND CONTROL OF ATTENTION OR WILL

From what has already been said it is clear that a worker cannot really will to do a thing that he has never done. He may desire it because of some instinctive or inborn tendency or because he has acquired a certain habit or because of some organic or fancied need, and so *learn* to do it. But he cannot will to do anything until after it has once been successfully done. The child must, therefore, in a sense, learn to will as he learns everything else. This is done by getting an idea, a motive, or a stimulus that will incite him to do the thing desired. After it has once been done he can more definitely desire it, because, having done it before, he knows how it feels to desire it and also to perform it. This successful performance of the act develops a feeling of confidence in his ability to do this thing, because he knows he can do it. By succeeding he develops

¹ Compare "Factors that determine selection," Chapter XXI, section 2.

not only a belief and confidence in his own ability to succeed in this particular performance but a certain persistence or power of determination which accumulates as his successes are multiplied.

One of the most important secrets of training the will is therefore to arrange matters so that you can succeed most of the time. If things are arranged for a child so that he always gets what he wants, his desires will soon become so strong that it will be almost impossible to break, as we say, his will. A horse that has never been hitched to a load which he could not pull will gradually develop the habit of pulling to such an extent that he will react in this way until he drops exhausted in his tracks, because he has never learned that the load will not come when he is told to go.

It is so with an athlete. The way to develop the ability to exert oneself to the limit in the high jump, for example, is to keep the bar down to where it may be cleared most of the time, raising it a little at a time, as greater skill and the ability to release and direct the necessary energy to clear it at the higher levels are developed.

In a similar way, when a child learns to walk, the problem is to keep him succeeding. His natural desire for something which he does not have makes him exert himself to get what he wants. But his efforts and will may be paralyzed in two ways: (1) by a decline in the strength of his desires or (2) by meeting with repeated failures, accompanied not only by disappointment at his lack of success but by other inhibiting stimuli, such as the pains encountered in falling, being laughed at or frightened. Such ideas and emotions as are aroused by failures and ridicule inhibit the ideas which normally lead to further trials and to final success.

It should, therefore, be clear that one's mental initiative and power of persistence can really be cultivated. Students and other workers desiring to increase their personal efficiency may be trained in a way that will make them able to put more

effort into their work and to apply it more consistently and effectively in the performance of their tasks. They may, in fact, be helped to develop the habit of putting *all* their available energy into their tasks, or so much of it as is needed to enable them to succeed with all they have planned or are required to do. This may be done in the following ways :

1. By planning their work or by having it planned for them in such a way that they can succeed most of the time.

2. By making it a practice to complete everything that they have planned or decided to do, thereby developing the habit of succeeding with everything that they undertake.

3. By strengthening in every possible way their purposes and desires which serve to focus attention on the things to be done. This is the natural method of releasing the energy required in their performance.

4. By arousing through actual success the faith and confidence of one's associates and friends. This should be carefully cultivated and used as an additional incentive for further effort and endeavor.

5. By cultivating and maintaining a certain attitude toward one's tasks and work.

All these methods of strengthening the will should be described in more detail.¹

(1) *Place of Attainable Desires in Developing the Will*

From what has already been said it is clear that greater persistence and strength of will cannot be developed by chaining oneself to a series of tasks that are too difficult to perform. To strengthen your desires or to gain confidence in your ability to succeed, which really enables you to keep on trying and so to release the energy that is required for the performance of your tasks, you must plan your work in a way that will keep

¹ Compare also on this point the discussion in Chapter XXI on "How to learn to keep yourself fully and continuously applied to your tasks."

you succeeding most of the time. That is to say, you must not overtax your strength of will. It is absolutely necessary to adapt your work to your ability and strength of will. Nothing but the habit of succeeding with your tasks can develop in you the necessary self-confidence and belief in the possibility of further success, which enables you to continue your efforts and to keep your purpose steadfastly enough in mind to release your energy in sufficient amount to succeed.

You should, therefore, fit your task to your mental and physical ability and to the amount of persistence which you have already developed. You should remember that you cannot do as much work in the afternoon as in the morning or when you are at your best periods of work. In planning your work you should take into account not only your ability and physical strength but your mental and physical fitness for work at the time, and not drive yourself to the point where success can no longer be attained. If you do, you develop the habit of failing, which means not only failure for the task in hand but a severe blow to the development of your will. By repeatedly hitching a horse to a load which he cannot pull, one soon develops in this animal a habit that prevents him from even stretching the tugs in response to any kind of stimulus that the driver may apply. All students and workers should remember that repeated failures actually paralyze their effort and will.

The same thing is true of the management of others. Their tasks must be adapted not only to their general ability but to the strength of will which they have already developed. A dull boy in school must be given something easy, something with which he can and will succeed. A bright boy should be given something hard, but not too difficult to enable him to succeed. A vigorous, healthy adolescent student in high school needs something that takes much energy and effort to perform. In our direction or management of others we should, therefore, be careful to adapt to their native ability and skill the work or the tasks we ask them to perform.

(2) *Need for Strengthening your Purposes and Desires*

One of the most important ways of increasing your strength of will is to increase your desire for the things that are to be done. This may be accomplished by making a list of all the reasons one can think of or find why this particular thing should be done. Write these down in a more or less permanent form, so that they may be kept more constantly in mind, thereby acting as an incentive to effort and as a means of resisting (because of this positive stimulus) all other ideas or stimuli that naturally arise to weaken your purposes and resolves. You should also make prominent the direct practical and personal value of your tasks or work. This makes a direct appeal to one of the strongest native desires that a worker possesses and so helps to hold more firmly in mind the idea of finishing the task.

The true basis of all one's interests and desires is this inner urge which makes up man's real nature. This and the habits that have been acquired during the course of one's own personal experience and as a result of his formal training really constitute the interests and desires which serve as the driving forces in life and enable one to release his stored energy. They drive one on to do all his work, and to do the other things which he does that are not directly elicited by the external stimuli which affect him. If a student's present purposes and desires can be related to these deeper instinctive urges, or if they are in line with his acquired interests and desires, they will be greatly strengthened as a means for eliciting the responses that must be made to reach his goal.

(3) *Rôle played by Success in the Development of Will*

Nothing is more important for developing strength of will than to form the habit of completing everything one undertakes. This may be aided by careful planning and by arranging conditions so that we *can* succeed. The habit of finishing

all we undertake must be established to develop the determination called strength of will, or the persistence that will enable one to succeed with his future tasks. Success in one thing makes one feel he can succeed with something else. Failure in several instances gives rise to the feeling that one cannot succeed at anything. Experiments made on school children who were permitted to fail in most of their work for a week showed that at the end of this time they were unable to do things that were easy before this habit of failure had been established. The effect on success of completing promptly and well each task undertaken acts, on the other hand, as a sort of tonic for the nerves. It lessens fatigue, enables one to release more energy and to direct it more easily and accurately in the performance of other tasks. Any animal or child must *believe* that he can do the things which he is required to do. The real basis for this confidence in his ability to succeed, the thing that makes him try, is his past successes. These alone give him the confidence and determination to go ahead and finish his work. The confidence of one's teacher, employer, or friends may also help, as we shall presently show. But the only way to develop the determination needed to insure further successes is to keep oneself succeeding with practically everything one undertakes.

One trick of successful teaching consists in giving pupils new tasks so easy that they can be performed, then increasing their difficulty as greater powers of will are developed. Half the stupidity of pupils in school is produced artificially by the teacher because she does not adjust each student's tasks to his ability to succeed. This cultivates the habit of failure where success should have been carefully planned for, to crown all their efforts. The successful foreman and manager of men in business or industry tries to place each man at the job for which he is by nature and training best fitted. This develops the habit of success and the self-confidence needed to release the energy required to do the work.

(4) *Importance of a Proper Attitude toward One's Tasks*

To succeed in the highest way and to be able to release and direct one's energy most effectively a worker must, therefore, believe not only in the worth-whileness of his tasks but also in his ability to succeed. He must believe that his tasks are really possible and not too difficult for him. Some of the most important things ever done in the world have been done by young men and women who did not know how difficult the things to be done really were, but who believed that these things could and ought to be done. This attitude is needed to enable a worker to hold his purposes in mind firmly and consistently enough to find the necessary means for their realization. It enables him to release energies that, without this attitude, he could not call into use at all. The practical effect of this attitude toward one's work and the inhibitory effect of its opposite are well illustrated by the following examples.

In all experiments to test one's immediate memory-span the series of words or digits is gradually increased to the point where no more can be noted and recalled immediately after they are presented. If such a series of digits or words be gradually increased in length, it is found that only about seven words or digits can be retained and reproduced by the subjects without a mistake, whereas when the series is lengthened to eight or nine words only two or three of the list can be reproduced. This is believed to be due to the fact that the series of eight words suddenly arouses a feeling that the series is too long, which inhibits the attention at a definite place in the series, with the result that the subject forgets all, or nearly all, that was previously impressed upon his mind.

The influence of a worker's mental attitude or purpose on the quality and quantity of the work he can do is further illustrated by the following instance taken from Jastrow's *Fact*

and Fable in Psychology and quoted by him from a report made by Mrs. Mary Cole Baker :

In tabulating the census returns for a certain year a new and very complex machine was installed to keep track of a number of items such as age, sex, color, occupation, etc. After five weeks of preliminary training and practice on the machine, during which time a careful study was made of the machine, the symbols to be memorized, etc., the operators who had begun with the expressed idea that this work was exceedingly fatiguing and difficult, and that it called for exceptional ability and skill, were able to complete, on the average, about 500 cards per day. But this record seemed to the workers to call for such excessive effort that they protested against the publication of the workers' scores and their use as a means for stimulating them to do more work.

After the work was well under way about 200 new clerks were put into one room and scattered about among the force already at work. These new recruits had no experience with the schedules, and knew nothing about the symbols. In fact they had never seen the machines. They saw those around them working easily and rapidly, and in three days several of them were doing 500 cards per day. In a week nearly every one had reached this standard while the general average was rising. There was no longer any question of nervous strain. In fact one of these new operators who had not had any special training on the machine broke the record by completing 2,230 cards in one day.

Mrs. Baker adds :

It is thus demonstrated that an unskilled clerk, with an environment that proves the possibility of a task and suggests its easy accomplishment, can in three days succeed in doing what a skilled clerk, with preliminary acquaintance of five weeks with the symbols to be used, could only do after two weeks of special practice, and this because the latter, doubtless not a whit inferior in ability, had been led to regard the task as very difficult.

It is clear that one of the necessary conditions for the greatest efficiency in study and other types of work is the development of a proper mental attitude toward one's work.

(5) *Practical Influence of the Faith and Attitude of One's Associates and Friends*

Other illustrations of the practical effect of such mental attitudes and beliefs may be found in Book's *The Will to Learn* and *Learning to Typewrite*,¹ also in James's *The Energies of Men*.² A factor which is much less understood is the faith and confidence which one's associates and friends express in his ability to succeed or to make good in his work. This is, of course, in part created by one's own successes and by the strength of will which he manifests. But quite apart from this the faith and confidence expressed by one's teacher or by one's associates and friends is a most important factor that either paralyzes his efforts and will or helps him to tap unused sources of energy and power that enable him to do things he could not possibly do without the aid of such stimuli.

This faith, either expressed or implied, is a very practical and important factor in education and life. It can still bring miracles to pass and remove mountains of difficulties. Assume that your brother is good, and he will be good ; trust the erring, and he will err no more ; believe that your pupil has gifts, and he is likely to develop them ; consider him a dunce, and he will prove your assertion.

The things which actually develop strength and power of will as described above are, therefore, the following : (1) attainable desires ; (2) strength of desire ; (3) the habit of completing everything one undertakes to do ; (4) greater self-confidence and power to persist coupled with an unshakable belief in one's own ability to succeed ; and lastly (5) the faith and confidence of one's friends and associates or employer. The practical

¹ W. F. Book, *Learning to Typewrite*, chap. xx, pp. 358-379. The Gregg Publishing Company, 1925. See also *Pedagogical Seminary*, Vol. XXIX (December, 1922), pp. 305-362.

² William James, *The Energies of Men*. Moffat, Yard & Company, New York, 1908.

conclusions in regard to the best methods for strengthening the will are, therefore, the following :

1. One must plan his tasks so that he *can* succeed most of the time. As he gains knowledge and power he may undertake harder and harder tasks.

2. He should make it a life purpose to *finish* everything he undertakes.

3. He should form the habit of *succeeding* with everything he undertakes. This develops self-confidence, a very necessary factor in the whole chain of events. One cannot really will to do anything or keep trying to do it if he *knows* that it is impossible for him to succeed. On the other hand, really to believe that he can do a thing means that he will keep trying until he actually finds a method that will enable him to succeed. It should, however, be noted that it is only the man or woman who rarely if ever fails that is capable of this sort of "willing."

4. Success in one problem or field gives strength for success in another. This makes it helpful to contemplate one's successes and records, for such contemplation gives confidence and strength for future tasks.

5. Success serves as an actual nerve tonic that is fundamentally necessary for mental health and for creating the individual initiative that makes further advancement possible.

The inhibitions that naturally arise when our purposes are not clearly and constantly held in mind are of two sorts: (1) An idea or emotional state may arise in some special sphere or in connection with a single task, and then spread until it affects one's whole mental life, destroying his self-confidence, depressing his emotional life, and diminishing or even paralyzing his efforts in every direction. Such an effect was produced on a particular boy in school by the action of a teacher who told the principal of the school in the boy's presence that the boy was no good; that he was coming to school only to play football and should be sent home. This remark so affected this particular boy's efforts and emotional

attitude that he not only failed in this teacher's classes but also failed in all his work until the principal succeeded in implanting a different idea in the boy's mind. (2) Other inhibitions, while arising in a special sphere and having a definite retroactive tendency in this sphere, do not seem to go beyond it. This type of paralysis of will was well illustrated by the examples given under section (4) above.

The only way in which the worker can remove such inhibitions or "fear thoughts" and strengthen his will is not by trying to get rid of the distracting idea or inhibiting emotional attitude as such but by giving his entire time and thought to his work. Think about the things you *really want to do*, clarify your purpose and plans and strengthen your desire for the things you *really want to do*, in the ways already explained in this chapter and the preceding one. If this be done, the inhibitory thoughts will "fold their tents like the Arabs and as silently steal away."

6. PLANNING TO MAKE THE RIGHT USE OF YOUR AVAILABLE TIME

In Experiment I, Chapter II, you made a study of how efficient you were in handling your total supply of time. You were there asked to keep a record of how you spent your total time for one week. This experiment revealed how much time you spent each day in profitable employment and how much time you wasted. It also showed just how you were wasting the time you were not using in a profitable way. In the present experiment you will be given an exercise in planning to use all your time in a profitable way.

EXPERIMENT VI

Purpose. To determine how successfully you can plan the use of your available time.

Method. State on Form V (p. 146) under item 1, time "Planned," how you propose to use your total time each day for a week. Begin

on any day you please, but make your plan for a whole week. After your plan is carefully made, showing just how you propose to spend your total available time for the week, begin to execute your plan; that is, proceed to work according to the schedule you have made. Keep an accurate record of how you spend your total time each day for the week to see to what extent you are able to carry out the plan you have made. Space for this item is provided under the items on Form V, and your entries will indicate how your total time was actually spent. If you spend a part of your time in doing other things than those listed in the chart, the blank used to keep a record of how you use your time should be modified accordingly. A careful record should also be kept on a separate piece of paper of the preparation you make for each thing that you have planned to do.

Results. Your results will show how successful you are in making and in carrying out your plans. You may find that you will not be able to carry out your plan exactly as you made it. This may be due (1) to the fact that your plan was imperfect, that is, not carefully enough made, or (2) because you did not make adequate preparations for carrying out each item of your plan, or (3) because of a laxness or let-up in your determination to dispatch your plans, or lastly (4) because you failed to take into account certain facts which upset your plan before it could be fully carried out.

Your percentage of efficiency in *planning* for the use of your *time* may be roughly determined by dividing the total number of hours or items that you planned for by the total number in which you were engaged during the day or week in the exact way in which you had planned. This will give the percentage of efficiency for the week in planning to use all your available time.

A similar record made at some future date will reveal how much progress you are making in this particular element of efficiency.

A valuable part of the experiment consists in keeping a record of the preparation you must make for each thing to be done. This is important for successful planning. You should also keep a record of the time you save each day by improving your plans and also keep a record of how or why you saved this time. Both will help you in planning your work and in the execution of your plans.

EXERCISES AND QUESTIONS ON THE TEXT

1. In what specific ways is the will or the strength of one's desires related to personal efficiency?
2. Why do most persons fail to achieve all that their native endowments, energy, and ability would enable them to do?
3. How may the hidden stores of available energy best be released or used to achieve one's purposes and aims?
4. What at bottom is "the will"? How must one proceed to get better control over his desires or will?
5. Explain just what may be done to cultivate or develop the will.
6. How must one proceed to strengthen one's purposes or desires or to develop his will in the proper way?
7. Explain the practical value for the development of will (1) of planning carefully and completing everything that you undertake to do, (2) of keeping yourself succeeding most of the time, (3) of the attitude and faith of your associates and friends.
8. Explain the practical value of keeping an accurate record of your successes with each thing you undertake, and the progress you are making in learning to work in the most effective way.
9. Perform Experiment VI and explain how the experiment may be used to measure the progress you are making in learning how to use your time in a profitable way and as you have planned to use it.

REFERENCES

- BOOK, W. F. *Learning to Typewrite*, chap. xxi ("Need and Place of Measurement in Learning"). The Gregg Publishing Company, New York, 1925.
- GULICK, LUTHER H. *Mind and Work*, chap. i. Doubleday, Page & Company, New York, 1923.
- JAMES, WILLIAM. *Principles of Psychology*, Vol. I, chap. xi; Vol. II, chap. xxvi. Henry Holt and Company, New York, 1890.
- JAMES, WILLIAM. *Talks to Teachers on Psychology*, chaps. xi and xv. Henry Holt and Company, New York, 1916.
- KING, HENRY C. *Rational Living*, chaps. ix and x. The Macmillan Company, New York, 1906.
- WOODWORTH, R. S. *Psychology*, chap. xx. Henry Holt and Company, New York, 1921.

CHAPTER VIII

TYPES OF DECISION AND FATIGUE OF WILL

1. IMPORTANCE OF PROMPTNESS IN DECISION AND OF PERSISTENCE AND DRIVE

Experiments in the field of learning have shown that it is intense effort rightly and systematically applied to the task in hand that enables a learner to originate new and better methods of work. Porter, for example, found in his study of learning in birds that the individuals and species which showed the greatest restlessness or the most perseverance in their trials succeeded best in mastering the problems which he had set for them to solve. The English sparrow surpassed all other birds studied in ability to learn because of the increased persistence which it displayed when confined in its puzzle cages.

The same is true of human beings. The race is not to the swift but to those who persevere. Individuals with mediocre ability often succeed better than the brightest members of their class because they possess the necessary determination to succeed, while students with the highest type of mental endowment often fail in life because they lack the necessary driving power to keep them effectively and continually applied to their work. In business, in science, in art, and in every field of human activity it is intense and consistent effort effectively applied to one's tasks that enables one to get where one wants to go.

Some people are easily discouraged. They quit when the first real difficulties arise. Others forge ahead in spite of all handicaps and difficulties that are thrown in their way. This

is well illustrated in the training of athletes. Mr. Gulick, former director of physical training in New York City, has written as follows :

The men who can run the mile at a good gait are the ones who resolutely keep on. It is not so much a question as to the size of their chest, the leverage of their legs, the height of the body, or size and power of the heart. It is fundamentally a question of the willingness of the individual to force himself not to stop, not to yield to the influences that make one lie down. . . . A person with this strong driving power, will through the use of this power *develop* muscle, will develop the heart, and the ability to run, whereas the person who already has a well-developed body but who lacks this driving power, not only will fail to push himself ahead, but will soon lose even the normal capacity of this high powered machine.¹

It should, therefore, become increasingly clear that individual efficiency in study and other lines of work is determined first of all by the character of the ideals one holds and the intensity of his desires for their realization, and secondly by the amount of energy that one has at his disposal for accomplishing what he desires to do. While everything in the end depends upon the use that one makes of the knowledge and skill which is needed to direct his efforts in the performance of his tasks, nothing is more basic than promptness of decision and persistence of effort or strength of will; for these drive the individual on until he completes all the tasks that must be performed to get what he most desires. Most people fail in life and in their work not because of a lack of energy, not because of a lack of knowledge, nor because they are devoid of ideals or purposes and plans, but because they lack the determination or strength of will required to make the necessary preparation for doing what they most desire. That is to say, they are lacking in that type of driving power which makes them forge ahead and acquire the habits of action and thought to be described in the remainder of this book.

¹ Luther Gulick, *Mind and Work*, p. 114.

2. NECESSITY FOR CONSERVING OUR STRENGTH OF WILL

This driving power, this push of life, which makes every young man and woman reach out and desire to explore, and which keeps all of us going and on the alert until we achieve what we desire or plan, is about the most precious thing in the world. Like other abilities or powers it becomes exhausted and is used up in the conflicts of life and in doing the work which one has to do. It is, therefore, extremely important not only to learn how to develop this important power but also to learn to conserve it and to make the most of what one possesses. Like other human abilities this strength of will may be wasted, dissipated, or economically used.

To be most efficient in his work an individual should, therefore, (1) determine how much of this driving power he actually possesses and the type of will with which he has to deal. (2) He must learn how to conserve, cultivate, and economically use the particular powers of will which he possesses. In the rest of this chapter we shall attempt to show how each of these things may best be done.

(1) *Fatigue of Will*

In one sense there are as many kinds of fatigue as there are fundamental types of human activity. In multiplying one four-place number by another mentally the particular brain areas involved in imaging these figures and in making the necessary combinations are worn out or actually used up in the process. In moving one's arm continuously for half an hour certain waste products are generated which affect the synaptic connections between the nerve cells and the muscles and, as we say, cause the muscles to wear out. It also uses up the energy stored in the nerve cells which act as a battery to generate the nervous impulses that move the muscle. In experiencing strong emotions the nervous energy in extensive areas of the nervous system is used up and the blood stream

is filled with the waste products produced by the responses which the organism makes when such emotions are experienced. Recently the writer saw a group of young children become so completely exhausted by the excitement and joy aroused by a Christmas tree that long before the time had come to take their presents off the tree they had become indifferent to them. When these presents were finally piled in their laps, they manifested only the mildest sort of interest and joy.

The same thing holds for the parts of the brain and for the muscles that are used when one is compelled to make important decisions or when he is required to initiate and set going certain courses of action, like keeping oneself glued to a task for a whole week. When one problem after another is presented for half a day, each requiring an important decision, you experience greater and greater difficulty in making prompt and correct decisions because you have partially exhausted the energy stored in the part of your organism that is concerned with the control and execution of this particular type of work. You are experiencing what we are calling in this chapter the fatigue of will.

It should, therefore, be clear that one may actually get tired of trying. If you have tried to do everything that has come along every day just as well as you could, if as a teacher you have been courteous when the children that you are teaching have been steadily and persistently mean, if as a student you have been steadfast and faithful with reference to each one of your tasks and to your work as a whole, if you have kept your temper when you have been misrepresented and placed in a false position by your teacher or perhaps by the principal of the school, if you have kept such a steady grip on yourself for a very long time, there finally comes a time when you must get off alone. You feel that you must because if you didn't you would break down and yield. This is plain, straight will-fatigue.

Or if you have studied, say, mathematics, music, history, a language, or have done a number of other things one after another for a considerable period of time, you are less able to make yourself go on because you have exhausted that driving force which really enables you to do this type of work. You may or may not be tired because your muscles are fatigued or because any other part of your brain is worn out. You simply lose the ability to make yourself go on with this type of work.

The normal effect of such fatigue is well known to every student and worker. At his best every man is a man of mark if only he knew it. But when fatigued in the way indicated above he is exposed on every side. Important matters cannot be decided or dispatched if we have wasted our powers in making petty decisions or thrown it away on doing trivial things. The writer when thus fatigued finds it exceedingly difficult to stop work. Every little thing seems as important to decide as the more important ones. The decisions actually made come to have less and less finality about them until a stage is eventually reached where all sense of perspective in the making of decisions and all stability of judgment are lost.

If your will has become fatigued in this way, it either balks completely or goes wrong when an important decision has to be made. For these reasons you cannot afford to have your powers of will distorted by fatigue when important decisions must be made. In fact, it is entirely within your power to conserve your powers of will by rest and by a more economical use of the energies you possess.

The will may be unnecessarily fatigued, as follows :

1. *By improper planning of your work.* The most difficult and important things should be done when the will is fresh. The general tendency is to do the little things first, leaving the more important things until we are worn out by details, not realizing that the thing that uses up nervous energy most

rapidly is the performance of a long series of such unimportant tasks when one is ready for work.

2. *By wrong habits of work.* With many people the most serious part of any difficult task is *getting at it*. Such persons spend most of their time and energy in making up their minds many times. It is like climbing a mountain. The man who stops every few minutes to rest must, each time he continues his march, overcome the initial inertia of starting and getting his body in motion. This the man who moves on slowly and at a uniform pace escapes. At night the former is totally exhausted, the latter has scarcely taxed his will at all. Proper planning, and working according to a schedule, conserve our power of will more than anything else.

3. *By a failure to get down to business at once when you start to work, thus losing the impetus of a good start.* Many people tire themselves out getting started. When they do finally get down to the job itself, they are out of temper for it. It is making up the mind many times to get at it that wears out the determination or will.

To *conserve* your powers of will it would, therefore, be helpful to act as follows :

1. To do the hardest work first, when your mind and powers of decision are strong and fresh.

2. To jump into a job quickly and with zest while your mind is keen and fresh. Make your decisions right in the first place, then consider them final.

3. To persevere with each job until it is finished ; that is, to cultivate the habit of succeeding with every task that you undertake. This saves both time and energy and gives strength for succeeding tasks. This precaution is particularly needed by a student who possesses an action-pattern of the excessively deliberative, or Hamlet, type.

4. If you are of the type that requires long application to get "warmed up" to your task, continue after you begin and keep up "full steam" until you have a positive accomplish-

ment to show for your efforts. You cannot afford to put yourself oftener than is absolutely necessary through the costly preliminary steps required to get "under way." To do so would be an inexcusable and extravagant use of human energy.

(2) *Resting the Will*

From what has already been said the need for resting the "will" becomes increasingly clear. It is just as impossible to avoid fatigue of the parts of the organism that are concerned in initiating and directing our efforts as it is to avoid hunger or general fatigue. The important thing is to keep this fatigue of will down to the lowest possible point and to conserve in every possible way the powers of will that we actually possess.

One of the most important aids in this direction is not to drive yourself too long. Most successful men and women have learned that they can do better work by working fewer hours and learning to work more intensely and effectively when they work. This not only enables them to do more work but, what is infinitely more important, it also improves the quality of their work. One of the most important elements in acquiring efficient methods of work is for the individual to retain sufficient strength of will to stop when it is time to rest. It is easy for a faithful person to keep on working. It is difficult to stop. Few have the intelligence and strength of will to stop when it is time to quit.

It is, therefore, important for a worker to learn how to *rest* his will so that the most may be made of his powers and skill. And here it is important to remember that the individual differences in power to recuperate from fatigue that were discussed in a previous chapter hold for the fatigue of will. There is no one best way for every person to rest his will. The only general law to observe is, when you rest, to rest long enough to recuperate. How long this should be will depend

upon your action-type, upon your susceptibility to fatigue, upon the nature of your tasks, and upon your power to recuperate from the normal effects of such work. In this as in other types of fatigue the rest must correspond to the nature and extent of the fatigue. If your work has required constant choice and decisions, it is better to turn to something which does not exercise the will at all. Light reading does not require you to make important decisions; tennis might. A game of solitaire would be a rest for the will; playing chess generally requires the exercise of the same brain areas that have been worn out by your previous work. Each individual must, therefore, determine by actual observation and experiment how he can get the most rest for making in his work the prompt and final decisions that are so necessary for attaining the highest success.

(3) *Economy in the Use of the Will*

To make the most economical use of the driving powers which you possess is just as important as learning to conserve your powers of will by rest and change of work. There are two outstanding facts about the economical use of the will that should be remembered:

1. That the will seems to be taxed far more heavily to make the necessary decisions if one is fatigued.

2. That will, working parallel with interest, love, ambition, and curiosity, is less fatigued and many fold more effective than will working counter to these great inner compulsions.

There is a false notion prevalent in regard to the development of will. Many believe that the will can be cultivated by chaining a student or child to a difficult or impossible task. It cannot be strengthened in this way, as was pointed out in the preceding chapter. But interest and spontaneous attention work to the same end as will. They, in fact, reinforce the will and greatly lessen not only fatigue of will but fatigue of the

entire organism. A man can, for example, "go hunting and travel through the woods from morning till night, walking like a cat among the dead leaves, his ears and eyes strained to the last degree, and come home at night almost as fresh as when he went out." The same thing may be noticed in the reactions of a conquering and conquered army, or in the responses that are made by an athlete and by someone who considers the thing he does a disagreeable task. This effect of interest on one's ability to release and control his energies is well illustrated by Mark Twain's story of Tom Sawyer. Here a common menial task was raised to such a state of dignity that his boy friends were willing to pay for the privilege of whitewashing Tom's fence because of the special interest which he had aroused in this task. No sheer compulsion of will could possibly have achieved such a result.

The conclusion of the whole matter seems to be that when you are doing what you want to do, you can do more work, and do it more effectively, than when you are compelled to do what you do not like. In other words, the man who drives his work counts for more and succeeds better than the man who is driven by it. Great men and women sweep forward, surmounting every obstacle, on a high buoyant wave of belief in the importance of their work, which amounts almost to passionate enthusiasm. No sacrifice is too great in their eyes, because of the devotion they have to the thing aimed at.

But when a man is engaged in a work he does not believe in, heart and soul, a work that does not draw him in a large sense, calling out the best efforts of which he is capable, he has not found his right sphere. The constant prodding of his will by the sense of duty, moral resolution, or what not, is a constant tax upon his resources of will, and keeps up a state of constant mental maladjustment that prevents the most praiseworthy endeavors from attaining anything like adequate fruition.

One of the great arts of life, therefore, consists in interesting

oneself in his own plans and work to such an extent that it is accomplished under the direction of unconscious effort rather than by the tight rein of a consciously driven will.¹

3. TYPES OF DECISION AND WILL-TEMPERAMENT TESTS

To be personally efficient in his work an individual should not only determine how much of this driving power he possesses and plan to conserve, cultivate, and economically use what he actually possesses but also determine his own type of will or the habits of decision with which he must deal. It will, therefore, be helpful to give some information on how decisions in human conduct are made, and on the tests that have been devised to try to determine one's type of will or the particular action-pattern with which one must deal as he works.

(1) *How Decisions are Normally Made*

James, many years ago, distinguished five types of will which he thought prominent and universal enough to name and describe: (1) the reasonable type; (2) the impulsive or explosive type, where prompt and quick decisions are made because of weak or defective inhibitions; (3) the impulsive type, where quick and firm decisions are made because of very strong inner compulsions, such as was possessed by Napoleon and Martin Luther; (4) the emotional type, where decisions are firmly and promptly made because of a sudden change from an easy and careless mood to a more sober and strenuous one, or the reverse; (5) the more purposeful decisions, made when the individual feels that he himself, because of effort or by his own willful act, has inclined the beam. These various types of decision should be more fully described.

1. *In the reasonable type* of decision the arguments for and against a given course of action seem gradually and almost

¹ For practical suggestions on how this may best be done see Chapter XVI.

insensibly to settle themselves in the mind, and to end by leaving a clear balance in favor of one alternative, which we then adopt without further effort or restraint. Until this rational balancing of the books is consummated we have a calm feeling that the evidence is not yet all in. This keeps action in suspense. But some day we awake with the sense that we see the thing rightly, that no new light will be thrown on the subject by further delay, and that the matter had better be settled *now*. In this easy transition from doubt to assurance we seem ourselves almost passive; the "reasons" which cause us to decide seem to flow in from the very nature of things without any real help from the will. The real reason for the decision in such a case, James thought, was the discovery that we refer the case to a *class* upon which we are accustomed to act unhesitatingly in a certain stereotyped way.

James concludes that to make rational decisions, the important thing is a search for right conceptions about the things involved, and he recommends that persons in authority, who have to make many decisions in a day, should carry with them, as it were, a set of heads of classification, each bearing its motor consequence. In making their decision they could then seek to assign each new emergency to its proper class as soon as it arises. This would insure prompt and correct action. This he recommends because the concrete dilemmas which arise in life and in our work do not come up with labels already gummed upon their backs. A wise man, therefore, plans to find the name which suits the needs of each particular occasion best. He has schooled himself to respond promptly in these set ways. If this be true, the "reasonable" man is he who has a store of such stable and worthy ends and does not decide about any action he must take until he has calmly ascertained whether it is really detrimental or helpful to one of these ends.

2. Decisions are made impulsively (1) if one's inhibitions are defective or (2) if his inner impulsions are unusually

strong. In either case the decision is made before the evidence is all "in." No marked reason may appear why one or the other of a given pair of reactions should be made. The subject may even grow tired of the long and continued hesitation, or feel at times that a bad decision is better than none at all. Under such circumstances it usually happens that some *external* stimulus will upset the balance in the direction of one of the alternatives, to which we then feel ourselves committed. It is a case where we let ourselves drift with a certain acquiescence in a direction accidentally determined from *without* with the conviction usually present that, after all, we might as well stand by this course as by any other, for things are sure to turn out all right in the end, anyway.

3. Decisions made because of *exaggerated* impulsion, James believed, are equally accidental though in these cases the stimulus comes from within. The subject simply finds himself acting more or less automatically in the direction of one of the alternatives. This, after the distress of the suspense of inaction, makes the individual throw himself headlong in the direction in which his pent-up energy has begun to move. This type of decision does not often occur in the humdrum activities of everyday life, nor in cold-blooded individuals. It is characteristic of such world-shaking men as Napoleon and Martin Luther. With it there seems to go a sort of fatalistic temper of mind which strongly reinforces the strength of the energy just started on its exciting path of discharge.

4. One of the most interesting types of decision is that which accompanies the sudden "changes of heart" that often come into one's life when he passes from an easy and careless attitude or mood to a more serious and strenuous one, such as occurs in religious "conversion" or in the "awakenings of conscience" and in the "changes of heart" which make new individuals of so many of us. Here, because of some stimulus externally or internally applied, the whole scale of values for our motive and impulses undergoes a sudden change. The

consequence is an instant abandonment of the mere trivial projects with which we have been dallying, and an instant practical acceptance of the more grim and earnest alternative which until then had no power to elicit a response. When faced by death or shaken by intense grief or fear, one's character abruptly rises to another "level" and brings his deliberation and hesitation to an immediate end.

5. In the fifth type of decision the feeling that the evidence is all in and that reason has balanced the books may be either present or absent. But in either case we feel, in deciding, as if *we ourselves* by our own willful act inclined the beam: in the former case by adding our living effort to the weight of the logical reason which, taken alone, seems powerless to make the act discharge; in the latter case by adding something ourselves in place of a valid reason that does a reason's work. The feeling of effort is, therefore, rather prominent in this type of will. In all the former types of decision the mind seems at the moment of deciding on the triumphant alternative to have dropped the other alternative entirely or nearly out of sight. In this type of decision *both* alternatives are steadily held in view, and in the very act of discarding the vanquished possibility the chooser realizes how much he is losing in making his choice.

This type of decision, James believed, is relatively rare. Most of our decisions are made without such effort or strain. The reason why we believe that many of our decisions are made with such effort is due to the fact that *during* deliberation we so often have a feeling of how great an effort it would take to make a decision *now*. After the decision has been made with ease, we are likely to recall this experience and erroneously conclude that the effort was actually put forth in producing the choice.

If a student or worker knows to which of these action-patterns he belongs, he can plan his work much more effectively than he would otherwise be able to do.

(2) *Typical Action-Patterns and their Significance for Personal Efficiency in Study and Work*

As previously pointed out it is important to determine the habitual type of will which an individual possesses and upon which he must rely in making his decisions in accomplishing his work. These will-patterns are determined as follows :

1. By the amount of nervous energy at the individual's disposal.

2. By the tendency that is present in the individual for this energy to discharge immediately into the motor areas that innervate the muscles and glands or, on the contrary, to find a way out by some *roundabout* pathway of discharge.

Those who have observed the actions of children and men closely, or who have worked at close range with all kinds of persons in institutions, have distinguished two radically different types of will : (1) individuals with an explosive will, where the tendencies toward motor discharge are rather sudden and explosive in nature, either because of an *excessive amount* of nervous energy or because of a great simplification of the pathways of discharge in the nervous system ; (2) individuals with strong inhibitive trends, produced either by a low level of activity or by an undue elaboration of impulses in the nervous system. James's labels for these four types of will are as follows :

- I. Explosive will, caused by
 - a. Exaggerated impulsion
 - b. Defective inhibition
- II. Obstructed will, caused by
 - a. Exaggerated inhibition
 - b. Deficient impulsion

The first, or explosive, type of individual is usually of strong impulsion. For him to have an opinion is to express it. He monopolizes conversation, leads movements of reform, is a convincing speaker, and usually can sell himself for more than

he is worth. The man who scores low on compulsion or is troubled with inhibitions is of the Hamlet type and is more than likely to have his resolutions "sicklied o'er with the pale cast of thought."

This "drive" of the individual is one of the most important factors in a person's character. It involves not only the amount of energy which an individual possesses but also the use which he is able to make of the energy which he possesses. Since this output of energy and its discharge by a simplified or elaborated pathway helps to determine the efficiency of an individual in all study and work, the tests for determining one's *type of will* assume great practical importance. This is true because one's type of will determines the *use* which he will be able to make of his energy and of his intelligence or mental powers. It is easy to see that explosive tendencies of will might speed an individual of great ability on to marked success, whereas they would ruin the usefulness of a less intelligent man. We should, therefore, devote some space to a consideration of the methods of measurement that have recently been devised for determining the reaction-pattern which a particular individual may possess.

(3) *Will-Temperament Tests and the Special Features of Will which they attempt to Measure*

Tests which attempt to measure the use which an individual will be able to make of his energy and powers or to determine his type of will have been devised and partly standardized by June E. Downey, of the University of Wyoming, as follows :

- I. A series of tests seeking to measure the speed and fluidity of reaction. A series of special stunts attempting to measure :
 1. Speed of movement.
 2. Freedom from load, or the ease with which one's psychic machinery works.

3. Flexibility, or the capacity to modify one's habitual procedure.
 4. Speed of decision.
- II. Other tests attempt to measure an individual's general aggressiveness or the forcefulness and decisiveness of his reactions :
1. *Motor impulsion*. This attempts to measure the amount of energy that is available when all brakes or inhibitions are off, and the ease with which the brakes or inhibitions may be thrown off.
 2. One's characteristic reaction to contradiction.
 3. His resistance to opposition, that is, measuring the strength of determination, etc.
 4. The finality of judgment or tendency *not* to reconsider a judgment once made, etc. There are many "waverers" in the world who this minute "think they will," and the next minute "think they won't." Most of their energy goes into making up and changing their minds. A group of tests has been devised which attempts to measure the strength of this tendency.
- III. Tests designed to measure carefulness and persistence in reaction. These include stunts for measuring :
1. *Motor inhibition*, or the power to hold back a motor discharge, to keep an impulse under control, or to achieve a purpose slowly.
 2. *Interest in detail*. Executives who plan big programs of work, but who must leave the performance to others, and men who work with ideas rather than with their hands usually score low on this test. But engineers and architects or scientists normally score high.
 3. Tests for measuring the *coördination of impulses*, or the ability to handle a complex situation without confusion.
 4. Tests for determining volitional perseveration, or the tendency to keep on working at a given task.

Many interesting correlations between these various character traits have been worked out by means of these tests. For example, it has been shown that interest in detail usually

goes with flexibility and is rarely or never found where motor impulsion is strong, whereas finality of judgment is usually found with a high degree of motor impulsion but rarely with volitional perseveration and motor inhibition. In fact, they are almost never found together in the same individual.

By means of psychological tests, arranged to measure the presence and strength of each of these traits, will-profiles have been determined that picture objectively the relative strength of these various traits in the same individual. These give a diagrammatic representation of the action-pattern of an individual as determined by the tests. Several thousand of these will-profiles have, in this manner, been secured, showing the actual character of the individual's will-temperament.¹ One individual may, for example, score high on the first group of traits, indicating a strong *mobile type* of will. Another may score high on the last group of traits, indicating great deliberation in his decisions and movements. A third may rate high on the aggressive traits, indicating that he belongs to the explosive type. Other individuals have been found to rank fairly high in *all* the more important traits, with no distinctive feature in their will-profile chart.

(4) *Will-Temperaments Most Favorable for Success in Different Lines of Work*

Miss Downey while attempting to establish norms for her will-temperament tests secured records from twenty men and women who were eminent enough to be included in *American Men of Science*, in *Who's Who*, or in both. In general, their total score on the will-profile tests ran high. There was in practically all these cases either high speed and aggressive-

¹ For concrete examples of these will-profiles compare June E. Downey, *The Will-Temperament and its Testing*, chap. vi, pp. 76-85 (World Book Company, Yonkers, New York, 1923). If the reader is interested in determining his own type of will by means of these tests, he may learn how to do it by a study of this book.

ness or carefulness and aggressiveness. Many of the group also gave an extraordinarily strong reaction to opposition. When an obstacle was placed in the path of their moving pen, their writing increased in size, in pressure, and in firmness to meet the opposition so injected by the examiner. This was markedly absent in the responses of individuals who were less famous. A number of this group of eminent persons also showed a very high score in both *motor impulsion* and *motor inhibition*, which the author of these tests believes to be an important combination suggesting a powerful human machine under perfect control.

Some very characteristic differences were also found in the will-profiles collected from individuals belonging to different occupations. Certain marked differences exist, for example, between the individuals who are successful executives and those who are particularly successful in research. Miss Downey makes the following statement :

The successful executive runs relatively high on speed of movement and of decision, freedom from load, motor impulsion, reaction to contradiction, and finality of judgment. Flexibility is the one speed element which need not be emphasized in his profile. It is all the better if his high-speed scores are balanced by good records on motor inhibition and coördination of impulses, but it is questionable whether it is an advantage for him to score high on interest in details and on volitional perseveration. Too great preoccupation with details might cause him to hesitate to turn over to another the handling of subordinate matters, while too great perseveration might make it difficult for him to turn from one problem to another, and to dismiss each question from consciousness when a decision has once been reached and to focus all his energies on the next one to be made.¹

A successful scientist, on the other hand, needs a high degree of volitional perseveration and a keen interest in detail. He

¹ June E. Downey, *The Will-Temperament and its Testing*, p. 311. World Book Company, Yonkers, New York, 1923.

might well be slow and critical in his judgments, with a tendency to revise his decisions when new data are secured. He may have so much load that he would find it painful to shift from one thing to another. But he should not be troubled with the flight of time. He should also possess a vivid imagination that would give such a deliberate, critical temperament its creative spark. The most eminent scientist Miss Downey tested gave a slow, deliberate reaction, but scored excessively high on flexibility, which she believes to be "the final grace of the accurate thinker."

The case of a young gifted scientist, filled to overflowing with the idea of the beauty and importance of microchemistry, and his ardent, impetuous, and worldly minded wife has been picturesquely described by H. G. Wells in his novel *Marriage*, as follows:

Trafford, the hero of the story, brought from his laboratory into the everyday affairs of the world the same skeptical restraint of judgment which is the touchstone of scientific truth. This made him a tepid and indeed rather scornful spectator of political and social life. Party formulæ, international rivalries, social customs, and very much of the ordinary law of our state impressed him as a kind of fungoid growth out of a fundamental intellectual muddle. It all maintained itself hazardingly, changing and adapting itself unintelligently to unseen conditions. He saw no ultimate truth in this seething welter of human efforts, no tragedy as yet in its defeats, no value in its victories. It had to go on, he believed, until the spreading certitudes of the scientific method pierced its unsubstantial thickets, burst its delusive films, drained away its folly.

But his wife was of a very different temperament, ardent, impetuous and very matter of fact. "The practical trouble between your sort and my sort, Marjorie," says Trafford, "is the trouble between faith and realization. You demand the outcome.... We want to understand, and you ask us to make. We want to understand atoms, ions, molecules, refractions. You ask us to make rubber and diamonds. I suppose it's right that eventually

we should make rubber and diamonds. Finally, I warn you, we will make rubber unnecessary and diamonds valueless. And again we want to understand how people react upon one another to produce social consequences, and you ask us to put it at once into a draft bill for the reform of something or other. I suppose life lies between us somewhere. We're the two poles of truth seeking and truth getting; with me alone it would be nothing but a luminous dream, with you nothing but a scramble in which sooner or later all the lamps would be upset. . . . But it's ever too much of a scramble yet, and ever too little of a dream. All our world over there is the confusion and wreckage of premature realizations. There's no real faith in thought and knowledge yet. Old necessity has driven men so hard that they still rush with a wild urgency — though she goads no more. Greed and haste, and if, indeed, we seem to have a moment's breathing space, then the Gawdsaker tramples us under." ¹

The case of the successful *executive*, the railroad president, a bishop, or university president, has been well stated by Gowin in *The Executive and his Control of Men*. He writes as follows :

Such executives ordinarily are *not* typified by the musing Hamlet. The impulsive Moody, the freedom-loving, unchastened and romantic Garibaldi, the jovial William the Silent, the Cromwell who impressed strangers as if he "hath taken a bit of wine too much," the cheery, exuberant Clay, the strenuous Roosevelt, represent action, not the obstructed will. They have not inhibited decision in order that the intellect might wander in a maze of speculation, but rather their wills react healthily. As Lord Palmerston wrote, apparently explaining his own procedure: "I believe weakness and irresolution are, on the whole, the worst faults that statesmen can have. A man of energy may make a wrong decision, but, like a strong horse that carries you rashly into a quagmire, he brings you by his sturdiness out on the other side."

¹ H. G. Wells, *Marriage*. Duffield & Company, New York, 1912. A "Gawdsaker" is one who, according to Wells's hero, is always saying, "For God's sake let us get something done."

Complete knowledge before every decision is indeed only a dream of the future ; meanwhile we must act. In the twilight zone, one follows the light he has. Henry Clay, after examining a question in only a surface manner, readily espoused one side of it, persuaded of the absolute correctness of his own opinion. He no doubt represents initiative over done, but he inspired followers with a ready belief in his own infallibility and accomplished much while others were merely agreeing that the question was complex.¹

4. RELATION BETWEEN INTELLIGENCE AND WILL

It has been generally assumed that intelligence guides and directs the will and that this is its real purpose or biological function in the economy of nature. It would, perhaps, be more accurate to say that our action-pattern determines what use we shall be able to make of our intelligence or mental endowments. But superior intelligence will make an individual determine more accurately his endowments and handicaps and cause him to make such adjustments as are most helpful and efficient. It might even make up for some serious handicaps of will. But it should be remembered that such traits as abnormal inhibition of action may practically nullify genius, as superior intelligence may make amends for certain handicaps in our type of will.

In Miss Downey's group of twenty famous scientists there were three individuals whose will-profile showed that they were nonaggressive. The greatest scientist in the group showed a slow, deliberate, non-self-assertive profile but with a surprising peak for flexibility. In such inaggressive men a high degree of intelligence might easily overcome the handicap that would come from a lack of self-assertion or defective self-confidence.

¹ Enoch Burton Gowin, *The Executive and his Control of Men*. The Macmillan Company, New York, 1915.

5. DETERMINATION OF YOUR OWN ACTION-PATTERN OR TYPE OF WILL

As already suggested it would be valuable for every student or worker to get the most accurate measure of his habitual type of will that it is possible to obtain, so that he might better plan his work in accordance with his ability in this line. This would enable him to get the most out of his delicate human machine.

The experimental work thus far done indicates that these types of will represent deep-seated individual differences that in all probability are hereditary. The best thing that an individual could do would therefore be to determine his own peculiar gifts or handicaps in this direction, then make such adjustments as these facts would show should be made to get the greatest possible value and enjoyment out of life. It may, however, be that these character traits are *not all* hereditary. Then to know one's present weaknesses and his stronger tendencies of will would put him in the way of utilizing what is most helpful and good, and of eliminating what interferes with the realization of his highest purposes and desires.

The following experiment is designed to give *some* practical help for determining and for improving your own type of will. It should, therefore, be carefully performed and the results preserved for future reference and use.

EXPERIMENT VII

Problem. To determine as accurately as possible your general type of will or the particular kind of action-pattern which you possess.

Method a. By making careful and repeated observations on yourself ascertain (1) whether you possess what might be called an "explosive" will, (2) an obstructed will, or (3) a type of will that falls somewhere in between these extremes. If of the "*explosive type*" determine if you can whether your quickness of decision is due (1) to a strong inner compulsion that seems to dominate your

decisions and actions or (2) to a lack of deliberation or defective inhibition that prevents you from giving due consideration to the consequences of your acts before you respond. If you find that you possess what has been called an *obstructed* will, ascertain whether your failure to decide matters as promptly and finally as you should is due (1) to a lack of proper impulsion or inner drive or (2) to too much inhibition, needless reconsideration of facts that prevents you from deciding things promptly and once for all when a decision should be made.

Results. Taking the most impulsive individual among your acquaintances and giving his type of will the value of one and the most deliberative individual among your intimate friends and giving his reaction-pattern the value of ten, try to describe your own type of will by giving it a value that indicates the position you think you occupy between these two extremes.

Method b. Notice rather carefully for one day the general character of your reactions and decisions, making a note of the more important facts that you observe during this time, and then in the light of these recorded facts and the subsequent observations which you may make on specific points try to answer the following questions:

1. Do you make your decisions quickly or slowly?
2. Do you *move* quickly when you start to do a thing or rather slowly and deliberately?
3. Is it easy or difficult for you to change your habits or your ideas about a thing? Do you often change your decision about important matters when it has once been made?
4. Do thoughts come to you rather quickly and easily or does it take you some time to think and to work a thing out?
5. Are you aggressive, forceful, and decisive in your reactions or the reverse?
6. How do you normally and regularly react when someone contradicts you or opposes what you have said or want to do?
7. How do you normally react to difficulties placed in your way or when your desires or wishes are opposed by your friends or someone in authority?
8. Do you often reconsider a judgment or decision after you have made it or do you consider it settled when made?

9. Are you interested in details or do you find yourself considering only or mainly the larger aspects of your problems and work?

10. Can you work contentedly at a problem or task if definite results are not being achieved or do you demand immediate results in order to keep your interest and efforts up to their normal pitch?

11. Can you deal with or handle a complex situation or problem without confusion or do such situations tend to irritate or annoy you?

12. Are you what in slang we call a "quitter" or do you always finish whatever you undertake in spite of opposition or the many difficulties that are normally encountered?

Results. Make a careful study of your answers to these questions, with a view to getting a more exact line on your type of will than you have ever had. Check over your observations with some intimate friend or, better still, ask him to answer this same list of questions about yourself and compare your observations and answers with the answers which he has made.

These facts if carefully determined and verified by subsequent observations will show you the more important habits of reaction which you possess. Your next problem would naturally be to ascertain how far your present habits of spontaneous and habitual reaction are helpful to you in accomplishing what you desire to do in life. When this has been done you may take definite steps to develop a type of will that will be most serviceable to you in doing what you desire most to accomplish in life.

EXERCISES AND QUESTIONS ON THE TEXT

1. Explain why it is important or necessary for personal efficiency (1) to determine your present type and strength of will; (2) to economize and to conserve in every possible way your powers of will.

2. What five types of will or "action-patterns" were distinguished by William James?

3. From a careful study of sections 3 and 4 of this chapter and from the result you obtained in Experiment VII ascertain whether your own type of will is such as will make for the highest success in the occupation you have chosen as your life work.

4. What practical relationship exists between intelligence or capacity to learn and strength of will?
5. What is meant by fatigue of will? How is it produced?
6. In what way or ways may fatigue of will be kept down to a minimum?
7. In what way or ways may one's powers of will be conserved?
8. What is meant by resting the will? How may this be done?
9. Briefly explain what is meant by economy in the *use* of the will.
10. How would you proceed to strengthen your will or to increase your ability to stay with and finish the tasks you have planned to perform?
11. Point out the exact relation which exists between interest and will.

REFERENCES

- DOWNEY, JUNE E. *The Will-Temperament and its Testing*. World Book Company, Yonkers, New York, 1923.
- GULICK, LUTHER H. *Mind and Work*, chaps. x-xii. Doubleday, Page & Company, New York, 1923.
- JAMES, WILLIAM. *Principles of Psychology*, Vol. II, chap. xxvi. Henry Holt and Company, New York, 1890.
- SCOTT, W. D. *Increasing Human Efficiency in Business*, chap. xii. The Macmillan Company, New York, 1911.
- STRATTON, G. M. *Developing Mental Power*, pp. 36-71. Houghton Mifflin Company, Boston, 1921.

PART III

LEARNING HOW TO STUDY AND WORK IN THE MOST
EFFECTIVE WAY

CHAPTER IX

RÔLE OF HABIT IN LEARNING HOW TO WORK EFFECTIVELY

We come now to a consideration of the problem of how to use in the most effective way the mental endowments and energy which we possess. Inefficiency in study or in other lines of work may be caused in a number of ways: (1) By wasting our time or our energy and talents. A student of superior ability who plans to do only an average amount or quality of work does this, also he who fails to conserve his energy and time in the ways pointed out in Chapters III, IV, and V. (2) Inefficiency may result from the fact that we are doing wrong things or from a lack of proper ideals or purposes and plans, as was pointed out in Chapter VI. Or (3) we may have learned to work in a fairly efficient way, that is, learned to use our energy and mental endowments and time in doing proper things, but do only about *half* as much work as we can or ought to do. This source of inefficiency was described in Chapters VII and VIII. Lastly, (4) we may be grossly inefficient in our work because our energy and time are improperly applied to our tasks, as was the case with the business man we called Mr. X in Chapter I.

Learning how to work in an effective way is first, last, and all the time a matter of establishing certain habits, and a psychologist is ever mindful of the fact that it is possible to have complete and accurate knowledge *about* the principles that govern personal efficiency in every field and yet not be able to apply any of this information to his own acts or work. He realizes that it is only as such information becomes crys-

tallized into habits of action that it results in making a life more efficient. That is to say, a mere knowledge about the laws that determine individual efficiency is not enough. Such knowledge would be helpful, but becoming personally efficient is at bottom a matter of forming certain habits that must be established by actually doing our work over and over in the most effective way or until these methods of work become second nature.

1. WHAT A HABIT REALLY IS ¹

A habit may be roughly defined as the tendency to act time after time in the same way. James pointed out that the law of habit operates throughout the known universe. It is a habit of the earth to revolve on its axis once every twenty-four hours and to encircle the sun once every year. A piece of paper once folded tends thereafter to crease in the same place. This holds true of our clothing. An old pair of shoes has taken on habits which fit them more comfortably to our feet. These are examples of the law of habit in the physical world.

But living matter is still more susceptible to the law of habit. If you assume a stooping posture for several weeks or months, this method of standing and walking gets itself fixed as a permanent mode of response because it has become habitual. In like manner one may train himself to be cordial and friendly toward every person he meets, or always to wash his hands before he does his face. These are examples of the operation of habit in living things. There is, however, one particular form of living tissue that is more susceptible to habit than anything else in the world; this is nerve tissue. Nerve cells

¹ Some of the paragraphs in this chapter are quoted from the author's recent book *Learning to Typewrite*, published by The Gregg Publishing Company, New York. We are therefore indebted to these publishers for permission to use this material here.

are highly sensitive to stimuli of every sort; they are more easily modified than any other substance in the world and have the power of conducting impressions, set up in themselves, to cells located in other parts of the nervous system or body. The nerve cells in the sense organs of the skin, for example, are impressed by stimulations from the external world. A nervous impulse so generated is conducted over long nerve fibers through the spinal cord to the brain, where it is received by sensory neurones whose activity gives rise to a sensation. From here it is carried over association neurones in the brain to motor neurones, whence it passes down the cord again to some set of muscles, which produce a movement. All the neurones over which this nerve impulse passes are, of course, modified by the stimulus. But this is not all. The nerve impulse *leaves* an impression upon the various cells composing the chain over which the nerve current passes. This modifies them in such a way that when the first neurone in the chain is excited again, the nerve current tends to take the same pathway and to end in the same response.

It should be emphasized that the normal result of every nervous impulse is some muscular response. That is to say, every nerve current once started seeks an outlet in movement. Such a movement may be started by the stimulation of a sense organ or by an idea or purpose. In the latter case it starts in the association areas of the brain without direct stimulation from a sense organ. But no matter where or how the nerve impulse starts, it seeks a *way out and always prefers pathways which have already been traversed*.

It, therefore, becomes clear that all animals, and human beings in particular, are forming habits from the first days of their life. Habits of responding in certain ways to the stimuli which affect them develop whether they wish to acquire them or not. We are continuously developing various habits of action and thought and soon become mere "bundles of habits" which determine the reactions we are able and likely

to make in response to specific situations and stimuli. This is illustrated by practically everything that we do. If I present a list of words such as "white," "up," and "good," and ask you to write down the first word that comes to your mind as you read them, most readers will write "black," "down," and "bad" in response to such a request, because of their mental habits. But not only are our mental responses determined by the habits which we have inherited or acquired; a typist's fingers, for example, are able to find the correct keys in typing or to make the correct reach for each separate letter-making movement in writing each word, no matter in what order these letters may come, because of the habits of response that have been established by previous practice. He is able to avoid all mistakes in typing, if he is 100-per-cent accurate, because of the finger habits and habits of mental control which he has acquired.

2. GENERAL SIGNIFICANCE AND USES OF HABIT

The advantages and disadvantages of habit are reasonably well understood by the average student and worker. It is, for example, generally known that the habits which any learner has already acquired either facilitate or interfere with the acquisition of any new habits that are to be established. The exact *kind* and *amount* of influence which one's previous habits exert in the case of specific instances of learning are unknown. But it is common knowledge that the fixedness of certain habits tends to make all of us move in ruts or in traditional ways unless we are continually striving to learn new things. But the advantages of habit far outweigh its disadvantages, and all learners should be keenly aware of the adjustments that should be made to both these facts.

Habit helps an individual to be consistent. It makes it possible for people to judge what to expect from a given per-

son or group. It helps society to be stable, and to incorporate modes of action conducive to the common good. James called it the "enormous fly-wheel of society" which keeps everybody and everything in its proper place. It also makes for accuracy, ease, rapidity, and precision in our various acts and responses. The human body is a living machine which may be adjusted with a high degree of nicety to its environment, and habit is the mechanism which makes this adjustment possible.

There is no more miserable human being than one in whom nothing is habitual but indecision, for whom the lighting of every cigar, the drinking of every cup of tea, the time of rising and going to bed every day, and the beginning of every bit of work, are subjects of direct volitional deliberation. Full half the time of such a man goes to the deciding or regretting of matters which ought to be so ingrained in him as practically not to exist for his consciousness at all.

This quotation from Professor James calls attention to the fact that habitual acts do not have to be consciously controlled. In one's study and daily work the more details that one can hand over to the effortless custody of automatism the more his higher powers of mind will be set free for their own proper work in effecting the necessary higher types of control. Correct and desirable habits are, therefore, our best allies and friends. Wrong and undesirable habits are our worst enemies.

These advantages and disadvantages of habit are so striking and pertinent for all who desire to learn how to work in an effective way that a further word should be added on this point before we conclude this brief description of the rôle played by habit in learning to work effectively. These advantages and effects manifest themselves not only in learning but in everything which animals and people do. They have been so clearly

stated by Professor James that we can do no better than quote his words. After pointing out some of the ethical consequences of the law of habit he writes as follows :

The physiological study of mental conditions is thus the most powerful ally of hortatory ethics. The hell to be endured hereafter, of which theology tells, is no worse than the hell we make for ourselves in this world by habitually fashioning our characters in the wrong way. Could the young but realize how soon they will become a mere walking bundle of habits, they would give more heed to their conduct while in the plastic state. We are spinning our own fates, good or evil, and never to be undone. Every smallest stroke of virtue or of vice leaves its never-so-little scar. The drunken Rip Van Winkle in Jefferson's play excuses himself for every fresh dereliction by saying, "I won't count this time!" Well! he may not count it and a kind heaven may not count it ; but it is being counted none the less. Down among his nerve cells and fibers the molecules are counting it, registering it, and storing it up to be used against him when the next temptation comes. Nothing we ever do is, in the strict scientific literalness, wiped out. Of course this has its good side as well as its bad one. As we become permanent drunkards by so many drinks, so we become saints in the moral and authorities and experts in the practical and scientific spheres, by so many separate acts and hours of work. No youth need therefore have any anxiety about the upshot of his education, whatever the line of it may be. If he keep faithfully busy each hour of the working day, he may safely leave the final result to itself. He can with perfect certainty count on waking up some fine morning, to find himself one of the competent ones of his generation, in whatever pursuit he has singled out. Silently, between all the details of his business, the *power of judging* in all that class of matter will have built itself up within him as a possession that will never pass away. Young people should know the truth of this in advance. The ignorance of it has probably engendered more discouragement and faint-heartedness in youths embarking on arduous careers than all other causes put together.

3. LEARNING TO WORK EFFECTIVELY A MATTER OF ESTABLISHING CERTAIN HABITS

Our study of the biographies of the most successful men and women in every field of human activity and a careful study of their methods of work revealed the particular sets of habits which made them efficient. It was found, for example, that they all worked in a certain way: (1) All had clearly defined ideals or definite purposes and plans such as we described in Chapter VI. (2) All planned their work. (3) All scheduled more or less completely both their time and their tasks or made *detailed* plans for their work. (4) All had learned to dispatch these plans or to work according to the schedules which they had made. (5) All paid special attention to the conditions under which they worked, making them as favorable for work as possible. (6) They gave special attention to making a careful analysis of their tasks and work for the purpose of finding the best way of doing the things which they wished to do, even to standardizing their routine tasks so that their minds might be freed for other and higher things. (7) Most of these successful individuals also worked according to a definitely formulated written plan which served the same purpose for them that the working drawings and specifications made by an architect or engineer serve for a builder.

These elements in a successful method of work — definite planning, scheduling one's time and tasks, dispatching one's tasks according to plan, making conditions most favorable for work, analyzing and studying each job or task to be performed so that the best method for its performance may be found, working according to a definitely formulated *written* plan — represent not so much information or knowledge *about* these various things, but a *system of habits* which these most successful persons acquired by their own efforts or as a result of special instruction. It was, in fact, the possession of this

hierarchy of habits that enabled them to work at their tasks in the most effective way. To learn how to work effectively means, therefore, the acquisition of a *definite group of habits*, and the problem of learning how to work effectively becomes one of acquiring the specific habits of action and thought which make one efficient or able to follow a definite and scientific procedure when confronted by his tasks. It is the chief purpose of the rest of this book to point out how these necessary habits may best be established.

4. SOME PRINCIPLES WHICH CONTROL THE FORMATION AND FIXING OF HABITS

Since becoming truly efficient in your methods of work consists in establishing certain sets of habits, as has already been pointed out, it would be helpful to all who desire to develop these particular habits if we should describe somewhat in detail the principles deduced from a study of nervous action and the science of physiology that really condition the establishment of all habits. For if these laws are obeyed, the process of developing the habits to be acquired will be greatly facilitated; if they are violated, because of ignorance or neglect, the rate of learning will be greatly retarded.

(1) *Make a Correct Start*

The first one of these practical principles is that we must guard very carefully all pathways leading to the brain. Nerve tissue is very impressible, as is well known. Everything that touches it leaves an ineradicable trace. Students and workers can, therefore, control the formation of desirable habits only by observing great caution in the selection of the things that impress them and in making correct responses from the start. Many wasteful and wrong habits arise in the

course of experience and training from a neglect of this principle. Harold Smith in his *Seven Speed Secrets of Expert Typing* writes as follows :

If you start wrong you limit yourself and your earning power ; if you ever learn the correct way you must take time to *unlearn* the wrong way, and then learn over. This unlearning and relearning is a most disagreeable and disheartening task. Not until one is faced with the evil effects of doing a thing in the wrong way can he fully appreciate the reason for learning correctly the first time. This is not a sermon on an unknown subject ; it is a cold statement of fact. It pays to start right.

Nerve pathways should, therefore, be closely guarded with respect to *what enters*. They should also be guarded with respect to the *way* things enter. The teacher and the learner should always remember that *as the first pathway is cut, the subsequent nervous currents will be directed*.

(2) *Make an Emphatic and Determined Start*

A second maxim for the economical fixing of desirable habits is that we should make *an emphatic start*. Some habits are fixed by one or two performances. This occurs when the stimulus and its emotional coloring are so intense that a pathway is made in the nervous tissue by a single performance sufficiently marked to attract the nervous current in this direction ever afterwards. It is therefore well for learners to surround themselves with every conceivable aid in order to make as lasting an impression from the start as is possible. Teachers should make it easy for learners to make the correct response from the start, and easy to use the correct technic and difficult not to perform in this way.

For example, if you desire to learn how to study or work in the most efficient way, surround yourself from the start with a large number of aids to this end. Formulate and write down the best reasons you can think of why you should improve

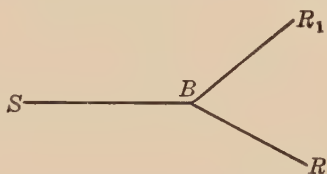
your present methods of work, why it is necessary to be consistent from the start, why it is desirable to follow the counsel of a skilled teacher or one who is himself an expert in this field. Tell someone else about your decision and determination to make yourself truly efficient in this type of learning. Such efforts at the beginning will give you sufficient momentum to prevent discouragement, and may keep you from falling into wrong habits of mind and work and so greatly facilitate your progress in this type of learning. "For every day during which wrong tendencies are postponed adds to the chances of their not occurring again" or at all.

Man in the course of his long history has discovered the value of such devices and has developed certain customs which make use of this principle in the formation of important habits. When men decide to swear off smoking, they usually choose the opening of a new year when many other new things are being started; they then make solemn promises to themselves, to each other, and finally to their friends, not to smoke during the year. In religious conversion where the individual starts upon a new mode of life he makes a public avowal to this effect and often reiterates it in public in the formal services of the church. The Salvation Army always makes its latest convert and its weaker members carry and beat the drum. Such customs are mere precautions that help to bolster up the determination to form the *new habit* at a time when extraordinary effort and determination are required to persist.

In developing the habits which constitute skill in study or other types of work all students and workers should, therefore, take special pains from the start to surround themselves with as many aids for the formation of the particular habits which they seek to establish as is possible, for this will prove of invaluable assistance in the formation and fixing of the habits which they desire to establish, as the whole history of man's experience in the world abundantly shows.

(3) *Never permit an Exception to occur until the New Habit is securely rooted in your Life*

If the greatest efficiency is to be attained in the formation of the habits desired, the learner must never permit an exception to occur. Let us suppose that a learner of typewriting has formed the habit of striking the space bar too lightly to move the carriage forward to make the necessary space between succeeding words, and wishes to replace this habit of "slurring over" this necessary response by striking the space bar hard enough each time a word has been completed to make the carriage move forward. If the habit of slurring this particular movement has become deeply rooted by such wrong practice, the learner has worn a pathway in the brain



to a considerable depth, represented in the diagram by the line $S-B-R_1$. But in an earlier stage of writing the learner made the movement for striking the space bar correctly when he had finished writing each word. This means that he has also worn another pathway, $S-B-R$, to a considerable depth. By more careful practice, with attention carefully enough directed to avoid this mistake, the correct pathway, $S-B-R$, may be sufficiently strengthened by the correct practice to draw the nerve impulse in that direction. The learner's task is to deepen this desirable pathway to a point where the nervous current will flow into it instead of into the wrong pathway produced by repeating the incorrect responses which have been allowed to creep into his practice. But even after the correct pathway has been sufficiently strengthened to control the direction of the nervous impulse, the wrong pathway, $S-B-R_1$, is still open and will at the slightest provocation attract the nervous current in that direction. Now suppose that after he has regained his control over this particular

response he allows the same mistake to recur and so allows the nervous current to travel again over the wrong pathway $S-B-R_1$. One such unfortunate exception breaks down the bridge which he has constructed at B to $S-B-R$ and allows the nerve current to travel again in the wrong direction and so to produce a wrong response.

But this is not the only result of the exception. The nervous current as it travels over this *wrong pathway*, of course, cuts it deeper each time it takes the wrong course, so that the next time an opportunity presents itself for making this wrong response the nerve impulse seeks the wrong channel with much greater readiness than it did before, making this wrong tendency more difficult to overcome because greater effort and more conscious direction are required to prevent the mistake. Someone has likened the effect of such exceptions in the formation of habits to the result produced when one drops a ball of yarn that is partially wound. By a single slip more yarn is undone than can be rewound by a score of new windings.

(4) *Do not slight or fail to repeat the Correct Response after it has been Originated*

One of the most important points to remember in connection with the formation of desirable habits is that no habit can *ever* be established without making the *correct response*. There must always be a first correct performance of the habit to be established. This correct response must then be selected and repeated often enough to fix the habit as a permanent mode of reaction. The *exit* of the nervous discharge must, therefore, be as carefully guarded as the point of entrance, for this is the point where the desired result is actually produced. No habit can be formed by mere wishing or by sheer desire. The correct response must be made and repeated often enough to establish a fixed pathway of discharge, as was shown in the preceding paragraph. It is, in fact, the making

of the correct *response* that gives the new set to the nervous system or that works the desirable habits into its organic tissue. Nothing can be invented to take the place of the learner's response, and it would be well to remember, when new habits are to be formed, that the *path out* should always be the shortest and most direct. This insures economy both of time and effort in the performance. The necessary steps in habit formation are the origination, selection, and repetition of the exact responses to be established.

(5) *Seize Every Opportunity to act upon your Resolution to Succeed*

As already pointed out in the preceding paragraph, no learning can possibly take place, nor any new habit be acquired, without a reaction from the learner himself. This makes clear another maxim for habit formation; namely, that in every case of habit formation the learner should *seize every opportunity to act upon his resolution* to form the habits desired.

The reason why this aids in the acquisition of desirable habits will be better understood if you keep in mind the fact, already stated, that nervous currents once started always tend to seek an outlet in movement. These outgoing nerve currents leave their imprint upon the modifiable nervous tissues as inevitably as do the incoming impressions. It becomes clear, therefore, that if you want your resolves about learning to work in a more effective way, or your resolves about anything else to be of any service to you, you must *act upon them* speedily and often. "It is not in the moment of their forming, but in the moment when they take form in *motor effects*, that resolves and aspirations communicate a new 'set' to the brain." "No matter how full a reservoir of maxims one may possess, and no matter how good one's *sentiments* may be, if he has not taken advantage of every concrete opportunity to *act upon his resolution* his character or skill will remain entirely unaffected for the better."

Merely *determining* to learn how to study or work effectively is, therefore, not enough. These resolves must be crystallized into some form of action at the earliest possible date. In other words, the specific responses required to carry out one's resolves must actually be made. No resolve has in fact been completed until it has been thus acted upon. A student may, for example, determine to finish all the work he is required to do, but he has not in reality completed this resolve until he has actually planned and done his work in this way for several weeks. This is the crucial test which determines the strength and worth of a learner's resolves.

Teachers should, therefore, realize that they must direct their learners in a way that will not permit their many valuable resolves to evaporate into *mere feeling* or thin air, but in a way which will utilize all their resolves in the business of originating and fixing the specific habits that are to be acquired. For it is only by completing their resolves that the groove for the correct response is deepened.

(6) *Aim to keep your Faculty of Effort Alive while you Work*

James and other psychologists have also felt that it is decidedly advantageous for learners to *keep their faculty of effort alive by a little gratuitous exercise each day*. They mean that a learner should be systematically heroic in all the small and seemingly unnecessary points; that he should do something each day for no other reason than because it is difficult to do. This kind of drill, they believe, acts as a sort of insurance to protect the learner against making the exceptions or slips described in section (3) above. James writes as follows:

A man who has thus daily inured himself to habits of concentrated attention, energetic volition, and self-denial in little and unnecessary things, will stand like a tower of strength when everything rocks about him, and when his softer fellow mortals are winnowed like chaff in the blast.

5. SOME DIFFICULTIES NORMALLY ENCOUNTERED IN ESTABLISHING EFFICIENT HABITS OF WORK

In acquiring these necessary habits of work certain difficulties are regularly encountered by everyone who desires to learn to work in the most effective way. First, most individuals have not been well enough directed in the past to have formed the most economical methods of work. Their education and training has been carried on in such a way that they have acquired methods of work that are more or less inefficient. These old habits stand in the way of the more desirable ones to be formed and offer a certain resistance to the acquisition of the particular habits which we wish to acquire. This is one reason why it is so difficult to make ourselves do what is needed to establish the more efficient habits of work which we desire to form.

A second difficulty encountered in this type of learning arises from the fact that the process of acquiring the particular habits of thought and work which we seek to develop is such a slow and difficult process, requiring much time and a great deal of care to fix the particular habits that we seek to establish. This stern fact clashes with a natural psychological tendency that is very strong in us all; namely, the tendency to attempt to do more than can really be done at one time. We fail to realize that the habits to be formed must be developed *one at a time* and that great care should be exercised to fix firmly one set of these habits *before* attempting to acquire another set. The surest road to failure in this type of learning is to attempt to do more than can actually be done.

A third source of difficulty arises from the fact that most students fail to understand just what must be done to acquire the particular habits of thought and work to be established. They fail to see that we are here dealing not with a matter of acquiring certain bits of information *about* this subject, but with a matter of *originating, selecting, and fixing* certain habits

of work that really spell the efficiency they seek. Many persons think they have arrived when they get a certain amount of knowledge *about* this subject or when they see clearly what must be done. But a person has really not begun to make himself efficient when this has been accomplished. Because learning to work effectively, let us repeat, is *wholly* a matter of acquiring the habits of thought and action that enable one to work at all his tasks in a certain systematic and scientific way.

A fourth handicap to progress in this type of learning is the failure to see clearly and definitely just what habits must be formed and how these *particular* habits may best be originated and most economically fixed. It is also difficult to get a reliable and practical method for measuring the amount of gain that is being made in each of the necessary sources of advancement. We have tried in this chapter to give specific help on the first of these questions because it is the key to the solution of the entire problem. The rest of the text will be devoted to a discussion of the particular sets of habits that must be developed by all who wish to make themselves personally efficient in all they attempt to do.

6. MEASURING YOUR EFFICIENCY IN PREPARING AN ASSIGNMENT IN YOUR TEXT

Since one's previous habits and his mental and physical endowments must be taken into account in every case of learning if the most rapid advancement is to be made, each reader should determine as accurately as he can how efficient his present methods of study really are. This would reveal his need for improvement and also provide a means for checking up on one of the important sources of improvement in this type of learning.

As already stated, progress in this sort of learning is exceedingly difficult to measure, and the gains come from a number of different sources that must be separately measured. The

following method of measurement is intended merely as a beginning in this field and may be used as a means of determining roughly your present efficiency in doing a type of work that every student is called upon to do many times each day; namely, to get from a printed page or book the information that it contains on a certain topic or problem in which he is interested or which he has been asked to work out. The experiment should be carefully performed so that a tentative norm may be established with which your future performances in this line may be compared and your rate of progress in this particular regard determined.

EXPERIMENT VIII

Problem. To determine your present efficiency in preparing an assignment in your text.

Method. Read in your usual way the next chapter in this book or one day's assignment in some other subject. Do this at the regular time you have set aside for preparing your lesson in this subject and keep a record of the exact time you spend in the preparation. Then close the book and write down in your own words the *principal ideas* or most important points which the author made in the discussion. Write these points down in any order you wish, preferably in the order in which they were discussed. Do not refer to the text or to any notes until you have recorded as many of the important ideas presented as you can recall. Label and date this sheet and proceed as follows in the interpretation of your results.

Results. After this record has been obtained, make a careful analysis of the chapter or assignment you prepared, listing all the important points made by the author, and see that these points are of about the same value or length. If you wish, you may have this list of important ideas prepared by a classmate or by your instructor or at least checked up by him to see that no important points have been missed. This second list of ideas represents what you should have gotten out of the assignment.

The efficiency in studying this assignment may be determined by dividing the total number of ideas which you were able to record after your study of the assignment (taking into account the time

you spent in preparing it) by the total number of important points contained in the assignment. This will give you the percentage of efficiency of your present method of work, which should be compared with your efficiency in this type of work after special training has been given you on this point in Chapter XVII.

To take into consideration the time consumed in the preparation, the percentage figure you obtained by the above method of calculation should be divided by the total number of minutes spent on the assignment. This will give you a ratio indicating roughly your efficiency for a given unit of working time, which may then be compared directly with the ratio obtained in later experiments, provided your assignments are of about the same degree of difficulty and length and that the points are of about the same value.

You will of course realize in making this study that this method of measurement is rough and in some ways very inadequate, but it is far better than a sheer guess or than an opinion based on no measurement at all. You should therefore keep all the results obtained in this experiment for future reference and study.

EXERCISES AND QUESTIONS ON THE TEXT

1. Explain just what a habit is (1) on its practical or psychological side ; (2) on its neural or organic side.
2. What are the general significance and uses of habit in the economy of nature and life? How is habit related to learning? to personal efficiency in study and other types of work? (Compare sections 2 and 3.)
3. What six principles have been generally helpful in the establishment of habits of every sort?
4. Briefly discuss the following aids to habit formation : (1) making a correct and determined start, (2) never permitting an exception to occur until the desirable habit is well rooted in your life, (3) exercising the exact habits to be formed, (4) acting promptly upon each resolution to succeed with the particular tasks to be performed.
5. What specific difficulties are encountered when one resolves to acquire the particular habits that make him efficient?
6. How may one's efficiency in preparing an assignment in a text be measured? (Compare section 6.) What precautions should be taken when you attempt to measure your efficiency in this regard?

7. What was your percentage of efficiency in studying the assignment used in Experiment VIII? What uses may be made of this bit of information?

8. How could you determine your efficiency in reading or preparing an assignment in a text, taking into account the element of time or the exact amount of time you spent in your study of the assignment?

9. Explain just how the law of habit is related to the problem of learning how to work in the most effective way.

REFERENCES

- JAMES, WILLIAM. *Principles of Psychology*, Vol. I, chap. iv. Henry Holt and Company, New York, 1890.
- JAMES, WILLIAM. *Talks to Teachers on Psychology*, chap. viii. Henry Holt and Company, New York, 1916.
- WOODWORTH, R. S. *Psychology*, chap. xiii. Henry Holt and Company, New York, 1921.

CHAPTER X

PLANNING YOUR WORK TO MAKE THE MOST EFFECTIVE USE OF YOUR ENERGY AND TIME

1. NEED FOR SUCCESSFUL PLANNING IN STUDY AND WORK

When the author was a boy, he noticed how carefully his father planned all his tasks and work. Both his father and mother often discussed their plans for the work which all had to do on the farm. These plans pertained not only to the tasks for a particular day but for the week, for the season, and for the year, often for the next four or five years. When these carefully planned and necessary things had been done, the writer was always rewarded by a vacation, a fishing trip, or by being given an opportunity to do something which he wanted to do. In this way he not only learned to plan his tasks from day to day and for each thing that he had to do in managing the work on a typical Indiana farm but also fell quite naturally into the habit of studying each task to be performed and of planning how that particular job could best be done. He even figured out mentally as he worked how much of each day's work should be completed by nine o'clock, by eleven o'clock, by noon, etc., and found to his great delight that by such considerations and study of his tasks his day's work could be done better, much more easily, and with much greater personal interest. By this method he found that he could save a half-day almost any week that he desired and still keep well ahead of his neighbors who were working longer hours and just as hard, but devoting much less attention to the planning of their work and to the analysis of their tasks.

This demonstrated very early and in a very practical and emphatic way the value of planning. Some planning must of

course be done by everyone who does any kind of work. He must decide what he is to do and at least plan how and where to begin. But from this beginning point we have all grades of planning up to the point where every task to be performed and every important detail of each task has been carefully planned in advance and where the work is carried out in accordance with these carefully worked-out plans.

Take, for example, the case of running a transcontinental train from Chicago to the Pacific coast. On the Northern Pacific line two trains are started from Chicago each day, the Pacific Express in the morning and the North Coast Limited at 10.30 at night. They change engines and crews at certain definite points; they not only feed their passengers en route but also give them trout from their own fish farms while they are crossing the mountains, and a big baked Idaho or Montana potato when they cross these states. They provide their passengers with expert service of every sort, even to telephonic connections when they stop at the principal cities. They start at a specified time, reach each station on time, and do this thing three hundred and sixty-five days in the year because every detail that goes into the accomplishment of this marvelous feat has been successfully planned in advance so that only extraordinary emergencies will cause a variation in the schedule or in the performance of this vast coöperative undertaking.

A still more remarkable instance of successful planning is represented by the way in which our recent army of five million men was mobilized, trained, equipped for battle, fed, and transported overseas to France without the loss of a single ship or man. There probably never was a more remarkable example of successful planning on so large and perfect a scale.

The principle applies to everything which people do. There is no task so small, and no human undertaking so important or large, that it does not need to be carefully planned in advance. If one desires to mail a letter, to catch a train, to

prepare a meal, or to manage a billion-dollar corporation, he should plan for it in advance if he wishes to find the best and easiest way of doing it. In fact, the most important work of the world has always been done by men and women who carefully planned their work and their procedure in advance. A physician, for example, has his office hours, and a certain period of the day is set aside for making his calls. Only in cases of emergency is this schedule broken into. The only way, in fact, that a professional or business man can be assured of any time for recreation or play is to plan his work in such a way that a definite part of his day will be set aside for it and this time taken for relaxation and rest, which should be as carefully planned as the rest of his day is planned for the performance of his regular tasks.

Without such planning the most complex work of the world could never be done. Imagine what would happen if an attempt were made to run the trains on any large railroad system without a definite schedule, or with one that was not religiously lived up to by every employee of the road. Every reader knows what happens to a train that gets behind time and loses its schedule. It must sidetrack and wait for every other train on the road that is running on time. So with a worker who does not plan his time and his work; he not only loses time and energy but everybody who plans his work is able to forge ahead of him while he stands wondering why all his efforts and work do not yield the results which others seem to achieve so easily.

2. WHAT EFFECTIVE PLANNING INCLUDES

(1) *Necessary Steps in Successful Planning*

To plan one's work so that his plan may be most economically and successfully carried out a number of things must be done: (1) The worker must make a list of all the things that should be done in the time for which his plan is made. (2) He must

make a study of his work taken as a whole and of each separate task to ascertain the best order of doing these necessary things ; also the best way of doing them, how much time should be allotted to each thing to be done, the best procedure to follow, the equipment and materials needed, etc. (3) On the basis of these facts he must make out a definite schedule or detailed plan for the work, showing just what is to be done, the order in which these things are to be taken up, the time that is to be devoted to each task, etc. (4) This detailed plan should next be reduced to writing, or a set of practice instructions should be prepared, to show not only what is to be done but how the plan is to be carried out in detail. Lastly, (5) this detailed plan must be dispatched or promptly executed according to the schedule made, or no advantage will be derived from the planning.

(2) How to Prepare for Taking the Necessary Steps in Planning

To make such detailed and successful plans a number of things must be done: (1) Adequate preparations must be made for each phase of the work to be done. To make an effective plan the materials and equipment to be used and the external conditions under which the work is to be done should be standardized or made favorable for the work in hand and remain uniformly helpful until the *aim* of the study or work has been attained. College students have, for example, found it helpful, even necessary, to regulate the conditions for study in their fraternity homes in order to do effective work. This necessary precondition for successful planning and work will be fully discussed in Chapter XV.

(2) A definite interest must also be aroused in one's work taken as a whole, in his success, and in his advancement in efficiency. This important feature of planning and the psychological conditions which make for the most effective work will be discussed in detail in Chapter XVI.

(3) For the most successful planning one must also obtain and use reliable records, fixed standards, and pertinent facts. Such information can be obtained only by consulting reliable authorities on the subject or by making a detailed job-analysis of one's tasks and work. These factors will be discussed at length in Chapter XI.

(4) You should also make out a schedule and often a set of definite instructions for carrying out your detailed plan. This cannot be successfully done until most of your routine tasks and the more important operations involved in these tasks have been standardized by actual experimentation to determine the best way of performing them and the exact amount of time that should be allowed for each thing to be done. The importance and place of such analyses of your tasks and work, and the need for a definite set of instructions for carrying out these plans, will be discussed in Chapters XI and XIII.

(5) It is also necessary to make definite preparations for carrying out your plan after it has been made. Help for this final step in all planning and successful work is given in Chapters VII and VIII, dealing with the conservation and cultivation of will; in Chapter XIII, which discusses the importance of preparing a set of practice instructions for carrying out your plans; and in Chapter XIV, which explains in detail how one's plans can best be executed or dispatched.

3. TWO MENTAL CHARACTERISTICS REQUIRED FOR SUCCESSFUL PLANNING

Since plans should be made in advance for every task to be performed and for every relationship of our lives and work, it follows that successful planning requires, first of all, the use of a good imagination or the ability to picture what one will require in the way of materials, equipment, or other helps for a given task, *before* he is really confronted by the task itself. Some people cannot tell what they will need for the perform-

ance of a task until the need or actual job is upon them. Others can think accurately of their tasks beforehand, and can picture so accurately to themselves the situation that they know exactly what they are going to meet before they begin the work. That is to say, they can plan for it accurately enough to be fully prepared when the time comes for the work to be done. This ability to think accurately about one's tasks when they are not present to the senses is an *essential* characteristic for successful planning.

A second essential characteristic is the ability to think yourself in the place in which you will be later when you are performing the task; then ask yourself how much time you will need for the work, what materials and equipment you will require, just what you will have to do in the performance of this particular task, etc. — all *before* the actual time comes for the work to be done.

Recently the writer spent an evening with a very successful and skilled surgeon. It was the night before he had to perform a difficult operation. He got out and tested about one hundred instruments, every kind that he thought he might need. These were all arranged on a table in a certain order and each one tested to see that it was in perfect working condition. He even decided upon a particular arrangement of these instruments so that he would know where to reach if a particular kind was needed. He did the same thing for the other materials he would need. He carefully reviewed a specially selected set of drawings of the anatomy of the parts to be worked upon the next day, and consulted some of the best authorities covering not only the operation itself but the emergencies which had been reported in past operations of this particular type. He reviewed in his mind his own experiences with operations of this same general sort and stated to the writer what would be the best thing to do under each of the conditions that might arise. He even outlined and reviewed the exact steps to take in the performance of this

very difficult task, which, by the way, he had performed many times before. The actual operation the next day was no more skillfully performed than it had been accurately planned and thus mentally reviewed the evening before. And it should be stated that the patient's life was saved the next day by one of the emergency devices which this surgeon had so carefully planned for and had ready at hand when the emergency arose.

Such accurate planning can, of course, not be done except by an individual who can think himself in the midst of the actual situation in which he will later be placed, and who regularly does this *before* the work actually needs to be done. This requires not only a good imagination but also the information and experience needed to enable one to organize his knowledge properly and to take mentally the exact steps that must later be taken in the performance of the task.

4. DETERMINING THE VALUE OR GENERAL RESULTS OF SUCCESSFUL PLANNING

The difference between a man who plans and the man who does not is the difference between a man who is forever getting himself into a difficult situation, trusting to luck or to his own ingenuity to get himself out, and the man who, sitting quietly by himself, is able to make a mental picture of himself in successive stages of his work for hours, days, months, or even years ahead, and so to order his life and work that he never finds himself face to face with an emergency. Successful planning, therefore, enables one to avoid emergencies or to meet them successfully when they arise.

Successful planning also saves much time and energy for the worker, as the following experiments, if carefully performed, will clearly show. Perform Experiment IX as directed and make a careful study of your results, keeping them for future study and use.

EXPERIMENT IX

Problem 1. Plan some morning this week to get through with all your work for the day at two o'clock in the afternoon, or several hours earlier than usual, in order to go to a show or to go walking with a friend. Watch carefully the effects which such a plan, actually carried out, has upon your accomplishment for the day and upon your reactions during the time that you work.

Results. Assemble and study the results of your observations and answer the following questions:

1. Did you finish your day's work or all the work that you had planned to do before you left?
2. Did you do your work as well as usual or better than usual?
3. Explain your results.

Problem 2. Plan some morning this week to do a fourth more work that day than usual.

Results. Record carefully and accurately the results you obtain on that day and compare them with an average day's accomplishment. How do you explain your results?

Problem 3. Plan this week to finish every assignment made by your instructors just as assigned, following the directions they give you. Plan to finish it all by the end of the week.

Results. What are your results? Is it easier or harder to prepare your assignments when following such a definite plan? Why?

Problem 4. Try the following plan in your work as a student or in your personal life, or both, for one week and note and record accurately the results you obtain. Each morning before beginning your work jot down on a card or in your notebook a list of all the *important* things you desire to accomplish that day, preferably in the order in which you desire to take them up, which should be in the order of their importance. As you finish each task, or at certain intervals, cross off all the tasks you have performed.

Results. Compare your results on that day with an average day's work and answer the following questions:

1. Can you do more or less work in a day when following such a plan?
2. What effect, if any, does this method of procedure have on your ability to work? Does it make your tasks easier?

3. Does it save any time or energy?

4. How do you explain the results that you obtained in this experiment?

Problem 5. If you are not planning regularly how you propose to spend your weekly, monthly, or yearly allowance of money, begin at once to plan the expenditures of this money. You will be surprised at the result. Very few dollars have ever been saved except by *planning to save them*.

When the author was a boy a certain young man who had come direct from Germany only a few weeks before began working for his father at a salary of five dollars and fifty cents a week. This man planned to save fifty cents each week, to put aside two dollars and a half each week for incidental expenses, and to lay aside two dollars each week for clothes. A year later he began to work in a factory at a salary of seven dollars and fifty cents a week. He then planned to put two dollars and fifty cents each week in a savings bank. Within a year he moved to a larger city, where his expenses were higher and where he got a salary of ten dollars a week. He then planned to put three dollars into the savings bank each week, and planned to make his seven dollars a week go as far as the ten dollars received by his fellow workers.

This young man never rose above a salaried position, and never realized more than the regular rate of interest on his money, yet within fifteen years he had bought and paid for a beautiful home and had several thousand dollars in splendid securities.

He possessed only average ability, and there is nothing romantic or miraculous about his career. He is worth today about twenty thousand dollars more than 90 per cent of the men who began where he began, simply because he always planned for the use of every dollar of his income, while his associates spent their money as they made it, without making any definite plans for its economical use.

Problem 6. Another profitable exercise for students or any salaried worker would be to plan their wardrobe for the year. Most people buy their clothing when compelled to do so by necessity. Others follow every change in fashion, no matter how ludicrous or ugly. They purchase their winter clothing in November, their spring apparel in March, summer finery in May, and their fall

outfit in August. This means that they pay the highest prices for their clothing or everything they wear.

It is possible by *efficient* planning to buy your winter clothes in January or February, your spring garments in June, your summer apparel in July, and your fall clothes in October, thereby taking advantage of the dull season and saving about 25 per cent in their cost.

In similar ways time-saving expedients may be planned or invented. By such careful planning a teacher may unload many of her tasks on others, thereby freeing herself for other and larger things.

5. EFFECT OF PLANNING UPON THE ABILITY TO USE YOUR TIME IN A PROFITABLE WAY

In the first experiment, Chapter II, you determined how successful you were in using your total supply of available time. If you found that you were wasting considerable time, try the experiment here of determining the effect which planning to use *all* your available time and energy has on your ability to conserve it. If you are already efficient in this element of personal efficiency, you may omit this experiment.

Problem 7. To determine the effect of planning on your ability to use your total supply of available time as you desire to use it.

Method. Following the plan outlined in Experiment I, keep another accurate record for one week of how you actually spend your total supply of time *after* you have carefully planned to use each minute of the 168 hours you will have during this week.

Results. Compare the time lost this week with the time you wasted before you made this definite plan for using in a profitable way *all* your time. Make careful observations on the points called for in the following questions and record in some permanent place your answer to these and other questions that may suggest themselves to you.

1. Does planning reduce the amount of time you waste? How much?

2. Does planning improve your methods of work? How and why does it improve your methods of work?
3. Just how does planning help you (1) in saving your time? (2) in improving your methods of work?

In Experiment VI, Chapter VII, you were asked to plan the use of your total supply of available time for one week, and doubtless found that you could save considerable time for yourself by making such a plan. That planning a more efficient use of your time actually enables you to save a considerable amount of time will be shown if you keep an accurate account in this experiment of just how you spend your total time *after* you have tried to plan its efficient use. This experiment will show the gains you made in ability to use your total supply of time, due entirely or mainly to your attempt to plan to use it effectively. The same thing would hold if you planned to use all your available energy by proper methods of relaxation, or by rest and sleep.

The most important thing, however, is not merely to *save* a certain amount of energy and time. What is far more important than their conservation is to learn to *use* both more effectively in doing things that are distinctly worth while. *Efficient planning* covers both these points, and every reader should begin *at once* to plan what he will do with the time and energy which he is learning to save.¹

If as a result of your study of personal efficiency, as set forth in this book, you should simply increase your ability to do the work in which you are *now* engaged, you would not be permanently benefited but really injured by what you had learned. You should, in addition, learn by careful planning not only to save this time and energy but also to *use* all the time and energy you save in doing the things that are most worth while in living an efficient and useful life.

¹ For detailed suggestions and practical exercises on how to use the time and energy you learn to save by proper planning see Chapter XII, section 6.

6. RESULTS OF DEFECTIVE PLANNING

Defective planning or the absence of successful planning, on the other hand, results in marked inefficiency of various sorts. Many writers have called attention to the fact that the American people, as a nation, are rather defective in planning. Harrington Emerson, for example, has pointed out that they found and inherited a continent surpassingly rich in natural resources of every sort, which they have not planned to conserve. And because they have not planned to conserve these necessary things for the future they have wasted far more of their forest wealth than they have used. They have depleted the soil, and have allowed millions of acres of it to be washed away and carried into the sea. They have swept out of existence uncounted wealth in inland fisheries, game birds, and the herds of buffalo, antelope, elk, moose, and deer which formerly roamed the plains. They have, by wasteful methods of mining, rendered inaccessible millions of dollars' worth of coal and other minerals, and have wastefully burned up incalculable amounts of petroleum and natural gas, all because no definite and systematic national plans have been made to conserve and economically use these natural resources of the country.

The same wasteful tendency, due to a lack of planning, may be observed in the building of many of our cities, in the development of our universities and other public institutions. American cities have sprung up mostly without plan, and in many cases the present generation has been compelled to reconstruct them, building parks, straightening and widening streets at enormous expense, because no adequate plans were made for future development and growth. Rarely was any thought given to making these cities beautiful or healthful places in which to live. On almost every hand one can see tremendously expensive reconstruction work going on because the original work was not intelligently planned. In many

cases there will be waste of time, effort, money, and materials for an indefinite time because no adequate plans were made in the first place. In some cases the defect cannot be remedied at all.

In our educational work and in the training of children the same lack of planning is manifested. We are today teaching various school subjects and preparing young people for the various professions and trades without having analyzed these subjects or professions to determine what must actually be learned in order to be successful in them. We are housing thousands of criminals and taking care of our mentally diseased population without making any provisions for determining scientifically the causes of crime or the sources of the mental disturbances that make large numbers of our population thus socially unfit. We are spending several billion dollars annually for education, but have failed to determine with scientific accuracy how the learning which we seek to direct actually takes place. Moreover, many men and women take up occupations for which they are by nature and native interest unfitted because they have failed properly to plan their life work. They let themselves drift into the first work that comes along.

Because of this lack of proper planning most people fall far short of their highest possibilities, and society and the state lose their most precious asset, the capacities and endowments of its present and future citizens.

EXERCISES AND QUESTIONS ON THE TEXT

1. What is really meant by planning one's work and one's procedure in the performance of a specific task?
2. In what way or ways does such a definitely formulated purpose or plan influence one's reactions and ability to work?
3. List and briefly explain the steps that must be taken in successful planning.
4. What is really needed to be able to make such a successful plan for your work?

5. What mental characteristics must one have to be able to make successful plans for his work?

6. Explain on the basis of the results you obtained in solving Problems 1, 2, 3, and 4 of Experiment IX the general value of effective planning and the need for it.

7. What actual effects does careful planning have on your ability to use your time in a profitable way or in the ways you desire most to use it? Give here the gist of the results you obtained in solving Problem 7 of Experiment IX.

8. What are the normal results of defective planning? Illustrate by giving data from several fields of human endeavor in which planning has been neglected.

REFERENCE

EMERSON, HARRINGTON. Twelve Principles of Efficiency. Engineering Magazine Company, New York, 1917.

CHAPTER XI

MAKING A CAREFUL STUDY OR JOB-ANALYSIS OF YOUR TASKS AND WORK

After listing the various tasks to be performed in the time for which your plan is made, the next step in successful planning is to decide upon the order in which these things should be done and the time that should be allotted to each. This can best be done by making a careful study of each task to be performed, with the view of determining the best procedure to follow in its performance and then standardizing this most economical method as to both time and procedure. In no other way can the most efficient and workable plans be made.

1. HOW STUDENTS AND WORKERS GENERALLY ACQUIRE THEIR METHODS OF WORK

(1) An Example of Unstandardized Procedure in Work

A few years ago the writer had a student in one of his extension classes who stated that he worked fifteen hours a day. He complained bitterly because he was being overworked and said that it was ruining his health. A careful examination of the case showed that this middle-aged teacher did not really plan his work at all. Observations made of his procedure in the schoolroom revealed the fact that he turned feverishly from one task to the next as they came up in the regular course of the day, thereby wasting, it seemed to the writer, about 25 per cent of his supply of time. This time was lost by fretting about his work, making up and changing his mind many times

in regard to what he should do next, and by failing to turn promptly from one task, when it was completed, to the next.

He worked so many hours each day that the condition of his mental vigor and physical powers was far below standard. This led to much procrastination and to a sluggish method of work. He regularly kept others waiting on him and made more than the usual number of mistakes. Correcting these errors consumed much of his time and energy. All this greatly decreased his personal efficiency in the *performance* of his tasks. So far as the author could detect, he paid no attention whatever to making the conditions more favorable for his work. He made little study of his tasks and spent no time whatever on trying to determine in a systematic way how each task or his work as a whole could best be done, claiming that he had no time for such things.

Because he was too busy and too much harassed by his work to plan it carefully, and because he had failed to standardize any of his routine tasks or the objective conditions under which he worked at home or at school, leaving these *important* things to mere chance, his personal efficiency in the *use* made of his available time was only about 60 per cent. Because he failed to study his work and tasks carefully he spent much time in doing unnecessary things. He also spent many hours each week doing things that should have been turned over to his pupils, who not only would have done them as well or better than he but would have been delighted to do them because it would have made them feel that they were more of an integral part of the school. For these and other reasons the writer was convinced that this particular teacher was only about 40 per cent efficient in the *selection* he made of his tasks. This made his real efficiency only about 18 per cent ($0.75 \times 0.60 \times 0.40$).

In other words, a teacher who carefully planned his work, who studied each task and his work as a whole with a view to finding the best way of doing each thing to be done, and then

standardized his procedure would have accomplished just as much work in *three hours* as this man did in fifteen, and of far better quality.

(2) *Prevalence of the "Cut and Try" Method of Working*

Most persons work like this teacher and make few improvements in their methods of work because their experimentation with their tasks is not systematically done and no detailed and accurate record is kept of their observations and results.

In an investigation made at Indiana University during the first semester of 1924-1925 the attempt was made (1) to determine the difficulties which college students normally encounter in doing their work; (2) to determine what these students were doing to overcome or avoid these difficulties; (3) to ascertain the amount of attention they were giving to the study of their tasks; (4) to ascertain the extent to which they were interested in acquiring more effective methods of work; lastly, (5) to determine the kind of help which they thought they needed to learn to work in a more effective way.

To obtain reliable information on each of these points, five hundred students, about two hundred freshmen and three hundred upper classmen, were asked to give information on each of these points during a regular recitation period in their class in psychology. Ninety-eight per cent (97.7) of these students stated that they were definitely interested in learning how to study in a more effective way. Ninety-seven per cent (96.8) said that they needed definite help of this sort and proceeded to explain how it might be given. Only 3 per cent felt that no help was needed or that it could not be given. But notwithstanding this keenly felt need for assistance only half of these students (53.1 per cent) stated that they were making any study of their tasks with a view of discovering new and better ways of performing them. Over a fourth of these students stated that they had *never* made *any* attempt

to analyze their tasks for the purpose of discovering new and better ways of doing them, while 18 per cent of those who were making some study of their tasks stated that they had just begun to analyze their tasks.¹

It seems evident, therefore, that we as individuals and as a people give too little attention to the matter of studying our tasks. We obtain our methods of work not from systematic observation and careful experimentation but from haphazard trying or by imitating our elders. Even where we are instructed in a particular occupation or craft the best methods are seldom taught because they have not yet been determined.²

2. JOB-ANALYSIS ESSENTIAL FOR IMPROVING OUR METHODS OF WORK

But when a careful job-analysis is made of a given task or of a particular bit of work it will reveal (1) the things that a worker must do to succeed with that particular task; (2) the best sequence to follow in doing each of these necessary things. This reduces the procedure to the fewest possible movements and insures that these necessary steps will be taken in the most economical order. Lastly, (3) it determines the least amount of time and energy that should be put upon the doing of each of these necessary things.

It also enables one to determine and arrange the materials and equipment needed for the work. Placing the mortar board and the scaffold for the brick high enough so that the masons did not have to stoop each time they reached for mortar or a brick was an important factor in the standardization of the task of laying brick. In like manner the arrangement of the

¹ Several teachers in the elementary psychology courses where these tests were given had recently emphasized the importance of learning how to study and had given some suggestions in this direction.

² This is especially true for the work done in our schools. Compare the author's *Learning to Typewrite*, pp. 155-160. The Gregg Publishing Company, New York, 1925.

stove, sink, kitchen cabinet, etc. in a way that will save steps and labor for the one preparing the meal is an important factor in determining the most economical method of doing this particular kind of work.

Since there are many different ways of doing each thing that a student or worker is required to do and since there can be only one best way for that individual to do each one of these things, the chances that he will discover this way by accident or by imitating the example of others are very small. All students and workers need, therefore, to be urged to analyze their tasks and to study their work as a whole with the aim of trying to discover more efficient methods of work, and they should be so directed that they will form the habit of making such careful analyses of all their tasks, thereby learning how to discover for themselves the best ways of doing all the things which they will be called upon to do. Unless they form the habit of making such a study of their work and are definitely and constantly searching for new and better ways of performing their tasks, they will make few improvements in learning how to work, for reasons which the author has elsewhere explained.¹

(1) *Job-Analysis Illustrated*

By making a careful scientific analysis of the task of laying brick, covering every detail involved in the process of picking up a brick, spreading the mortar, placing the brick, tamping it, and raking off the extra mortar, Gilbreth determined that this task could be performed by making but four and one-half movements, whereas the average mason was using eighteen. By making careful and exhaustive time and motion studies of this particular task he determined the best order of making each necessary movement and the exact time that should be

¹ Compare W. F. Book and Lee Norvelle's "The Will to Learn," in *Pedagogical Seminary* (December, 1922), pp. 305-362; also W. F. Book's *Learning to Typewrite*, chap. xx. The Gregg Publishing Company, New York, 1925.

allowed for it, and for the series of movements as a whole. In this manner he determined the best method of laying brick and was able to increase the efficiency of his workmen about 400 per cent.¹

Mr. Taylor and his associates made a similar study of the process of loading and unloading pig iron and found that the same workmen who had been loading on the average twelve and one-half tons of pig iron a day could load forty-seven and a half tons, or nearly four times as much, after being shown how to economize their movements, and when given the proper interval for rest between the movements involved in doing this work. He found by actual experiment that a man carrying chunks of iron weighing ninety-two pounds should be under load only 42 per cent of the day, being without load, either returning or resting, for 58 per cent of the time. He also found that this rate of efficiency could be kept up day after day without any perceptible increase in general fatigue.²

(2) *Practical Value of Such an Analysis of a Task*

Such job-analyses of particular tasks may be profitably undertaken by any student or worker who is interested in improving his methods of work. With a little guidance and help from Mr. Gulick the young man mentioned in Chapter I of this book was able to win the swimming-under-water contest. One of the author's students learned by making a similar study of his work in the library to save two hours of time in one day. Another learned to save thirty minutes each day in getting dinner and washing the dishes. A young man saved several hours each month by changing his method of shaving and bathing. An assistant employed by the department to

¹ Compare Frank B. Gilbreth, *Bricklaying System*. M. C. Clarke Publishing Company, New York, 1909.

² See F. W. Taylor, *Principles of Scientific Management*. Harper & Brothers. See also W. F. Book, *Learning to Typewrite*, pp. 155-321, and *The Psychology of Skill*, pp. 25-88. The Gregg Publishing Company, New York, 1925.

score tests, compute averages, and record the results increased her output of work about 50 per cent merely by making a careful study of her routine tasks. Another student working in a large wholesale hardware store in Montana reduced the expense of operating that store more than 100 per cent by making certain alterations in the arrangement of the counters and shelves and by improving the method of operating the store.

(3) Standardization of Tasks Essential for Effective Planning

Such a study of your tasks must be made if you would learn how to make successful plans for your work. In fact, much concrete help in this direction has already been given. When you kept a record in Experiment I of how you used your total supply of time, you had to make some study of the various tasks which you performed in doing your work. When you took steps to improve your efficiency in the *use* of your available time, you had to make a further study of your work and tasks. When you try in the next chapter to make a definite schedule for your work, special attention will be called to the speed and accuracy with which you can do everything which you have planned. In fact, you cannot make a workable schedule for your tasks for even a day without having some idea of how long it takes you to perform each one of the tasks you have scheduled. And if you are at all interested in doing more things during that day by reducing the time devoted to each separate task, your attention will be sharply called to the need for studying each one of these tasks and your work as a whole with the view of ascertaining the best way of doing each necessary thing. Certainly no detailed plan can be made or effectively carried out unless the various tasks to be performed have been standardized in some such way as we have indicated. Moreover, no work can be properly dispatched unless you have a reliable method of getting it done.

Every student and worker should, therefore, make it a point to study his tasks in order that he may determine the best method of performing them and so be able to plan his work in detail, putting no more time or energy into each task than is needed to do it right. Teachers should impress upon their students the importance of making such a study of their tasks and work, and try to interest them definitely in this kind of learning. They should also give them a type of instruction that would help them in making such analyses of their work. For in no other way can the most effective plans be made or the best methods of work be developed and used.

3. EXAMPLES OF STANDARDIZED OPERATIONS IN NATURE AND INDUSTRY

One of the first results of such job-analyses of particular tasks is that the steps required to do the work are taken in the proper order, or in a way that requires the least number of movements and the expenditure of the least amount of time and energy. A good illustration of the principle here described is to be found in the human body. Here each organ and system of organs is differentiated for the performance of a particular function and is perfectly adapted to doing that type of work, such as the eye for seeing, the ear for picking up vibrations from the air.

The same law has been observed in the development of modern industry. The buildings of a factory are generally built and sometimes standardized for the production of a particular kind of product, as has been done by Mr. Ford in the construction of the buildings in which his cars are made. In a similar way each part of the car has been standardized by long and painstaking experimentation. The assembling of these parts has likewise been reduced to a standard procedure after much careful experimentation to find the best way of performing each process in this series of tasks. The

serviceableness of the car and the profits that have been made are due almost entirely to the fact that all materials and equipment, and all the more important operations and tasks represented in this vast industry, have been scientifically studied and standardized and that the various operations involved in the construction of this particular product have been analyzed to find the best way of performing them and the workman has been instructed to do the work in this more efficient and economical way.

4. HOW TO MAKE A SCIENTIFIC ANALYSIS OF A PARTICULAR TASK

(1) *Necessary Steps in the Standardization of a Task*

In making a scientific study of a particular task it is necessary to make a careful analysis of the work to be done in order to ascertain (1) what the worker must actually do. This involves making a list of the things that are to be done and the steps that must be taken in doing each of these necessary things. (2) You should make a study of each of the things to be done in order to ascertain the fewest possible steps that may be taken in doing them. Then (3) determine the best order, or sequence, of taking these necessary steps. (4) Make a "time study" of each of these separate processes to ascertain how long it takes the individual to do each of the separate things required to perform the particular task that is being standardized. And finally, (5) standardize the objective conditions and the equipment and material to be used, so that the work may be done with the least expenditure of time, money, and human effort. In almost any factory or study room, changes in the height of chairs or benches, in the elevation of tables and desks, in the position of books and tools, will show that this phase of personal efficiency is as practical as it is interesting.

The aim of all such job-analyses is (1) to eliminate all useless movements and processes; (2) to learn to make the necessary movements or to perform each separate task in the best order or sequence; (3) to determine the most economical rate of speed for making these movements or for doing each thing to be done, all to prevent unnecessary fatigue and to provide the most suitable periods for relaxation and rest during the period of work. In no other way can the greatest economy in the use of the time and human energy expended in the performance of a task be found.

(2) Some Difficulties encountered in the Standardization of One's Tasks

Progress in improving one's methods of work may come from two main sources: (1) from mastering and holding on to the improvements which the world has already made in the performance of that task; (2) by searching diligently and continually for new and better methods of doing each thing that one has to do, holding oneself ever ready to discard the old and traditional way as soon as a new and better method is found. This may best be done by making a careful analysis of each task, as already pointed out, employing the methods and technic of science as far as possible in obtaining, recording, and interpreting the facts needed to discover the best way of doing that particular job. But the tendency to learn by observation and to imitate or copy the methods of others is very strong. Moreover, the law of habit makes one hold on to the methods of work which he has already learned. Students and workers need, therefore, to be definitely encouraged to study their work and to standardize, as far as they can, their more important routine tasks. By the law of habit they will naturally tend to continue whatever method of work they have fallen into by imitation or by haphazard trying. It is only when they are keenly interested in improv-

ing their present methods of work that they will be able to invent new and better methods of performing their tasks.

Older persons will have still more difficulty in breaking away from their inefficient methods of work because they are less apt to be on the alert for new and better methods of performing their tasks, because they are more strongly controlled by the traditional ways of performing them, and because these methods are used by the majority of the workers around them. It will, therefore, be more difficult for them to make a systematic analysis of their tasks and to select and use the new adaptations in method which such a study would indicate should be made.

Improvement in planning, therefore, means hard work to begin with, but as new and better methods of work are invented and used they grow easier and easier until they become automatic. If practiced continually they will soon become the easiest as well as the most economical methods to follow in doing your work. But it must not be forgotten that after a new and better method of work has been originated by such study and experimentation as we are here recommending, it requires some time and care to drill yourself in its performance, as our study of the rôle of habit in this type of learning has already shown. Special care and considerable time are therefore needed to standardize and fix any new and better method of work.

5. EFFICIENT MEN AND WOMEN HAVE STANDARDIZED MOST OF THEIR ROUTINE TASKS

That some men and women can do more and better work in three hours than others can do in fifteen is a matter of common observation. One man works hard and for long hours each day as a station agent for a railroad, retiring after forty years of service with a little pension. Another begins at the same time by working in the freight house and at the end of

twenty-five years has built two transcontinental railroads and an empire. Such differences in the results which men and women actually achieve occur in every field of human endeavor and have been occurring ever since the world began.

Such individual differences in achievement have usually been explained as due entirely to a difference in mental ability or in the native endowments which these persons possess. Marked differences in native mental endowment do exist. But a careful study of the lives and methods of work of the most successful men and women in every field of work has shown that without exception they were men and women who possessed large visions and who were dominated throughout their lives by such ideals as were described in Chapter VI. They were also keenly interested in everything that enabled them to get ahead in their work and made it a habit of their lives to make a scientific study of their tasks in order to find new and better ways of performing them.

The difference between the efficient and the inefficient man is therefore not so much a matter of capacity or native mental endowment as it is a matter of learning how to use in the most advantageous way the particular powers which he possesses. Of course the persons who possess superior mental ability may learn how to do these needed things unaided, and what is more fundamental still, they will see more clearly that certain things *must be done* to attain the highest type of success in the world. Most people, however, cannot discover these things for themselves. Many are not even interested in this sort of advancement and so are shut out completely from the possibility of improvement in this type of learning, for reasons which the author has elsewhere pointed out. But we are not trying here to explain the cause of the success of these most efficient persons, but to delineate the path which they took and which other individuals must take to attain success in this type of learning. For doing the things that must be done to attain the highest success in this type of learning,

certain incentives are needed. These incentives represent an important element in attaining success in this type of learning and will be discussed in Chapter XVI.

6. MAKING A JOB-ANALYSIS OF A SPECIFIC TASK

In order to give the reader some practice in analyzing his tasks and to illustrate more concretely the principle involved, he is asked in the following experiment to investigate some particular task which he has to perform, with the view of determining the best way of doing that particular thing.

EXPERIMENT X

Problem 1. To make a time and motion study of the process of "rising and dressing" in the morning, with the view of standardizing this routine task.

Method. Analyze the whole operation into its separate steps or processes somewhat as follows: (1) rising (time it takes you to get out of bed after you wake up and decide it is time to get up), (2) breathing exercises, (3) general exercises, (4) bathing, (5) shaving or toilet, (6) brushing teeth, (7) combing hair, (8) manicuring nails, (9) putting on clothes, (10) brushing, etc. Keep a record each morning, or on alternate days, or on every third day, for ten trials, showing how long it takes you to perform each one of these necessary steps in the process of arising and dressing.

Results. Make out a "time curve" according to Form VI for each separate process or step in the operation, and answer the following questions:

1. Do your curves show any improvement in the performance of this task? To what is the improvement due?
2. How do you explain the nature of the progress indicated by your curves?
3. To what extent and in what way can you by the study of the separate processes involved improve your performance of this task?

Problem 2. To make a detailed job-analysis of some particular task or operation, to ascertain the best way of doing that particular bit of work.

Method. Take some task in which you are particularly interested. (1) Analyze the operation as now performed into its separate steps or part processes. (2) Ascertain whether each of these steps is necessary, eliminating all useless movements and processes. (3) Study the processes or steps you have left and determine by careful experimentation the best order or sequence of taking these necessary steps. Lastly, (4) determine by careful experimentation or trial the best rate of performing each one of the steps that are required to perform that particular task.

FORM VI. A SUGGESTION FOR REPRESENTING THE RESULTS
OBTAINED IN EXPERIMENT X

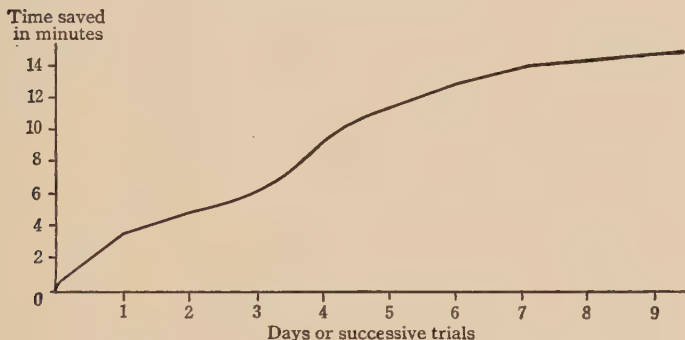


FIG. 10. Curve showing time saved by Mr. Z in arising and getting ready for breakfast

For standardizing certain operations or tasks, very special and elaborate methods must be invented and used to obtain the needed facts. This is one reason why every important human task has not been analyzed to determine the most economical and efficient way of performing it. For illustrations see Gilbreth's *Motion and Fatigue Studies*; also the author's scientific analysis of *Learning to Typewrite*.

Keep an accurate account of the time consumed in each division or phase of the task studied. Next ascertain the amount of time you save on each successive day or trial. Then represent your results in the form of a curve as indicated in Fig. 10. By using a different

type of marking for each curve the improvement made in each division of your task may be objectively pictured in your curves. Marked irregularity in your curve would indicate that the process had not been standardized or the habits established that are involved in that part of your work. When your curves cease to rise for several trials or days, approaching and maintaining a horizontal position, it is an indication that the limits of improvement in this direction have been reached.

If little or no improvement should be made in successive trials it would show that your procedure in this task had already been fairly well standardized.

EXERCISES AND QUESTIONS ON THE TEXT

1. What is meant by making a complete job-analysis of a particular process or task? Illustrate.
2. Explain the differences between a standardized and an unstandardized procedure in performing a given type of work or task.
3. How must one proceed to standardize the procedure or operations involved in performing a particular task?
4. How do most students and workers proceed in the performance of their tasks?
5. What is the best way to proceed to improve your present methods of work in any field? Illustrate.
6. Point out the real value of making an analysis or careful study of your tasks and work taken as a whole. How is this principle related to effective planning?
7. Give examples of instances where certain operations or processes in nature and industry have been standardized.
8. What specific steps must be taken to standardize one's procedure in the performance of a given task?
9. Why is it difficult to acquire the habit of making such detailed analyses of one's tasks and work?
10. To what extent do the most successful men and women among your acquaintances apply this principle in their work?
11. Explain the exact procedure that must be followed in making a complete scientific analysis of some particular task.

12. Give one or more examples from your personal experience of standardized and unstandardized procedure in work.

13. Why is it helpful or necessary to make a systematic or scientific study of your tasks to find the best methods of performing them?

14. What is meant by the standardization of a "job" or task?

15. Discuss the value of this principle of job-analysis for learning how to study effectively.

REFERENCES

- BOOK, W. F. Learning to Typewrite, Part II, pp. 155-325. The Gregg Publishing Company, New York, 1925.
- EMERSON, HARRINGTON. Twelve Principles of Efficiency, chap. xii. Engineering Magazine Company, New York, 1917.
- GILBRETH, FRANK B. Bricklaying System. M. C. Clarke Publishing Company, New York, 1909.
- TAYLOR, F. W. Principles of Scientific Management. Harper & Brothers, New York, 1919.

CHAPTER XII

MAKING AN EFFECTIVE SCHEDULE FOR YOUR TASKS AND WORK

1. PRINCIPLE OF SCHEDULING ILLUSTRATED

The general plan described in Chapter X must be reduced to a bill of particulars if the most effective planning is done. In other words, to make an effective and workable plan you must not only list all the things you have to do but show the order in which these things are to be taken up, when they are to be begun, how much time is to be allotted to the performance of each, etc. This means making a definite schedule for your tasks and work. Such schedules are made in the business and industrial world, and by the heads of every school or university, and may be made by a student or worker after a little experimenting of the sort described in the preceding chapter. They may be made for any human task or bit of work and are regularly made by those who do the most important work in the world today.¹

¹ It may be thought by some that such accurate and detailed planning as is urged in this book would make things too mechanical and routine-ridden to admit of enjoyment in life or work, and that it would prevent him from being original or from doing constructive work. But a little reflection will show that this is not an objection to the principles of planning and scheduling but really an argument in favor of all the principles set forth in this division of the book.

In the first place you should plan for enjoyment and for doing creative or original work the same as you plan for the performance of your routine tasks. How this may be done is indicated in part in the chapter on learning how to reason, Chapter XX. Moreover, acquiring the habit of planning your work and carefully scheduling your tasks, making it a habit of your life to execute your plans promptly as made, frees your mind for doing these higher and more original things, as was shown in section 2 of Chapter IX. When you learn to work in the way that is described in Parts III and IV of this book, you not only will be more

The best-known examples of such detailed planning are to be found in the schedules which railroads prepare for running their trains. Not only has each train a number and a name, it has a definite time to start from its terminal station and is allowed just so much time to get to the first station. It must also arrive at its destination on time, after traveling several hundred miles and transacting all its business on the way, including the loading and unloading of all passengers, the changing of crews, and everything else that must be done to get a nine-coach or twelve-coach passenger train from its starting point to its destination in a specified period of time.

2. GENERAL PURPOSE AND VALUE OF SCHEDULES

The whole object of such planning is to learn how to conserve energy and time, and to learn how to *use* it in the most effective way in the performance of one's tasks. The first important factor in personal efficiency is, therefore, to conserve your supply of energy and time, and to learn to use *all* the powers and time that you possess. But it is equally im-

efficient but if you make the right use of your schedules and plans and really plan for all the things that make one truly efficient and life most worth while, it will soon become just as easy to work in this more effective way as to work in the inefficient way that you now employ.

It is all a matter of habit, and what seems difficult now will become easy when the more effective habits of working which are here recommended are thoroughly established. The reason it seems more difficult to work in the effective way that is here described, if it does, is that you have already formed bad habits of work that are opposed to the more effective habits that we are urging you to establish in this division of the book. As soon as you have formed the habit of carefully planning your work and of standardizing your routine tasks, you will be able not only to save time and energy but to work in this more efficient way just as easily as you formerly worked in the more inefficient way. The best way to do original work is to plan for it in advance. In fact, the whole object of this book is to help the worker to save enough time and energy by the application of the principles here set forth to enable him to do more creative work and to get more of the desirable things out of life. This is possible because of the energy and time that he has learned to save and to use more effectively in the realization of his highest desires. (See also Chapter XXII.)

portant to learn *how to use* this energy and time in the most effective way in doing the specific things which you wish to do. If, for example, a student spends two hours in reading his assignment in history, when, by making a careful analysis and study of his task, determining the exact purpose of his study, and improving his methods of reading, he could master this assignment in one hour, his method of study is only 50 per cent efficient, even though he works very diligently and hard during the entire two hours.

Proper scheduling and the establishment of right standards by making careful job-analyses of your tasks are, therefore, required to enable you to make the most economical use of your energy and time. By finding the best method of performing each separate task you save not only much time but considerable energy as well.

For example, if a brick mason lays 200 bricks a day, whereas by improving his method of work, eliminating waste movements, and learning to make all necessary movements in the correct order and at the most economical rate, he could lay 800 bricks each day, he is only 25 per cent efficient, though he works all the time. Any student or worker may, therefore, use all the time and energy which he possesses and still be very inefficient in the *use* which he makes of this energy and time. That is to say, one student may work *all the time* and still not achieve very important results. Another may work less time and achieve *unusual* results. The former is effective in using *all* the time and energy which he possesses; the latter is effective in the *use* which he makes of his energy and time.

It is therefore important in scheduling your tasks not only to plan to use *all* the time and energy which you possess but to plan to make the *right use* of it by analyzing your tasks to find the easiest and best ways of doing what you are compelled to do. Efficient scheduling provides for both and enables you to measure more accurately your real efficiency because a detailed plan, such as we are proposing in this chapter, serves

as a sort of standard by which your efficiency in each important division of your work may be measured. By making a careful study of your tasks you may determine the best method of doing each thing to be done, also the time that needs to be consumed in its performance. By *scheduling* all your tasks and time you may eliminate all waste of time, because your day is full. You may likewise adjust the amount of work to be done to your available energy and powers, so that the latter will be properly conserved and most economically used in the performance of your tasks.

Effective scheduling, therefore, saves both time and energy, because it enables one to turn more directly, easily, and quickly from one task to another. You know what is to be done next and so need to decide but once. An enormous amount of time and energy is lost in worrying about what is next to be done or in thinking about the many difficult things which you have to do.

The story is told of a certain boy who became very nervous and finally so ill that his parents took him to a nerve specialist for treatment. The physician, after a careful examination, told the parents that the boy had been overworked and stoutly upbraided them for working this boy so hard. But the boy had done no actual work at all. His only task, each day, was to bring *one* pail of water from a spring a quarter of a mile from his home. This was demanded by his father to discipline the boy, who so dreaded the task that he completely wore himself out in thinking about it and in worrying about what he had to do.

Whether the story be true or not, it is a good illustration of what everybody knows; namely, that any student or worker is likely to wear himself out doing nothing if he fails to plan his work or to execute his plans promptly when they are made. If the boy had started promptly after the pail of water in the morning, this task would have produced no real fatigue at all. As it was, it wore him out completely.

Proper scheduling also insures that everything is in its proper place and in proper condition at the right time. It enables one to provide a time for each duty of the day and week, so that nothing will be forgotten because the plan was made when you were rested and at your best. Such plans are carefully formulated and usually written out, so that you need not worry about changing them or carrying them in your mind. As a result you finish your work with much less fatigue than would otherwise be possible. Instead of being worn out and having nothing to show for it, like the boy in our story, you have accomplished much and are not even tired, because your plan saved so much of your energy and time.

Any working schedule is also an aid to concentration. Lack of concentration is the greatest difficulty that students and workers encounter in their work. In a study made at Indiana University in 1924 five hundred students were asked to enumerate the most serious difficulties which they encountered in their work and were asked to describe what they had done to avoid or to overcome them. Ninety-seven per cent stated that their chief trouble was their inability to concentrate upon their work. Moreover, the remedies which these students proposed for preventing or overcoming this difficulty showed conclusively that they did not know how to overcome or how to avoid it. This can best be done by effective planning and by developing the habit of carrying out one's plans promptly and in detail. The most effective aid to concentration is better planning of one's work.

By establishing *standards* and by making a schedule which provides for sufficient exercise, recreation, and relaxation, you will be able to concentrate upon each task as it comes along, to the exclusion of everything else. Because you have planned carefully and well you are able to finish each task in its turn. You are not hurried, anxious, or worried, because you have allowed plenty of time for the performance.

What actually happens when one fails to plan his work has

been forcibly described by William James in his account of the nervously busy man who rushes from one task to another unable to finish anything that he undertakes, because he is so oppressed by the thought of all the important things which he has to do. He says :

Your intense, convulsive worker breaks down and has bad moods so often that you never know where he may be when you most need his help, — he may be having one of his “bad days.” We say that so many of our fellow-countrymen collapse, and have to be sent abroad to rest their nerves, because they work so hard. I suspect that this is an immense mistake. I suspect that neither the nature nor the amount of our work is accountable for the frequency and the severity of our breakdowns, but that their cause lies rather in those absurd feelings of hurry and of having no time, in that breathlessness and tension, that anxiety of feature, and that solicitude for results, that lack of inner harmony and ease, in short, by which with us the work is so apt to be accompanied, and from which a European doing the same work would nine times out of ten be free. . . . It is your relaxed and easy worker, who is in no hurry, and quite thoughtless most of the while of consequences, who is your efficient worker ; and tension and anxiety, and present and future, all mixed up together in our mind at once, are the surest drags upon steady progress and hindrances to our success.

If we would plan our work in a way that would free us from such inhibitions and worry, if we would school ourselves to keep cool, and learn to do what we have to do without expending more energy on each task than is necessary, thereby avoiding all nervous friction, we would be much more efficient than we now are and much vital energy would be saved that is now entirely lost.

A schedule when carefully made also enables a worker to carry out his general purposes and plans more effectively. It is far easier to employ every moment of one’s time as planned, by beginning and finishing each task at a specified time, than by planning to spend a certain number of hours at the task

during the week. This is clearly shown by the results obtained in the experiments the reader was asked to perform in Chapter X, where he was asked to test the general value of planning. To demonstrate the increased efficiency and the saving in time and energy which such detailed planning will produce we shall quote a few typical paragraphs from the written reports of students who performed these experiments just as they were described in Chapter X.

3. HOW DEFINITE AND SUCCESSFUL PLANNING INCREASES HUMAN ACCOMPLISHMENT

You will recall that in Experiment IX, Chapter X, you were asked to make several short tests for the purpose of getting an objective measure of the value of making definite plans for your work, such as (1) to plan some day to finish all your work several hours earlier than usual in order to go walking with a friend or to go to a show; (2) to plan some day during the week to do a fourth more work than usual and to note, record, and explain your results; (3) to plan definitely to finish every assignment made by your instructors that week; (4) to jot down on a card or on a desk pad a list of all the important things you desired to accomplish that day, in the exact order in which they were to be done, and to observe the effect which this plan would have on your accomplishment that day.

The following statements are taken from the reports made by different students who performed these experiments exactly as you were directed to perform them in Chapter X:

Problem 1. I planned on Monday morning to finish all my school work that day by six o'clock in the evening in order to go to a picture show, and obtained the following results:

I finished my day's work exactly as I had planned it and did my work, I believe, better than usual that day. I found that I could concentrate my mind and energies better on my work than

usual. This definite goal helped me to start every task more promptly and enabled me to stick closer to each task until I had finished it. When six o'clock came I did not notice any extra mental or physical fatigue. In fact I enjoyed the show much better that night than usual because I had my work all done for the next day. I went to bed at the usual hour and got a better night's sleep than I have had for a long time.

Another student wrote :

One day this week I had to do my work in a short afternoon, from 2 P.M. until 5.30, in order to go to a concert that night. I found to my surprise and delight that I could do all the work I had to do that afternoon in three and a half hours instead of the usual five. I did my work fully as well as usual. I made up my mind before I began that all my work must be done well in three hours and a half. Time seemed to go much faster than usual and I noticed that I could concentrate much better on my tasks and work. I was so busy that I had no time to let my mind wander to other things and I seemed to be able to keep it better applied to my work. I not only finished all my work on time but found when I got through that I had finished half an hour before the time I had set.

Another student said :

On Friday, July 20th, I planned to get through with all my work at 5.30 P.M. Before beginning my work that day I very carefully made out the best plan for that day that I could possibly make, one in which I could be very exacting with myself. I not only finished my work at the appointed hour but believe I did it in a much better manner and with more permanent results than I do on the days when I do not make out such a careful plan. The results which I obtained seemed to be due in my own case to the following things: (1) There was a relief from the ever troubling question as to what to do next, for I merely had to look at my plan and follow the schedule I had made before I began. This for one who is just learning to plan is a source of added courage, power, and satisfaction which seems to buoy one up and urge him on. (2) All this combined with the happy anticipation of having a night

off urged me on with renewed vigor. I am positive that I did more and better work in the amount of time I worked than I could possibly have done without such a definite purpose and plan. The anticipation of getting the evening off held out a new and desired goal which made it easier to coördinate my efforts and to use my mental and physical powers in doing my work. Every time my mind would chance to wander away from my work it would be treated (because of my purpose and plan) to the pleasant thought of "getting entirely through with my work *early* today." This made me able to do more and better work than usual. Without this purpose and plan the thought that I am behind in my work and can never catch up usually takes charge of me at such a time and paralyzes my effort. This latter hampering feeling and attitude was entirely absent today.

Another student wrote :

I wished this week to go to my aunt's in the country for the week-end. I always enjoy this trip more when I drive than I do when I go on the train. I found that my cousin would drive out at two o'clock on Saturday afternoon, while the train does not leave until seven P.M. To be able to go at the earlier hour I had to plan my duties for that day more carefully than usual in order to get all my work finished by two in the afternoon.

I finished my regular day's work sooner than my plan called for and did some other things besides. I did my work as well or better than usual because I had planned it very carefully beforehand and because I had my ride, and a day and night in the country to anticipate. This thought brightened my working conditions and made my tasks seem lighter and easier to perform. When my work was finished I was not so tired as usual. Working under such conditions gives a glow and a more intense vitality to the whole day.

A Japanese student had the following significant statement in the report of his results on this experiment: "If I plan to do more or better work on any particular day I find that I can succeed because I can concentrate better, think better, read better, and am able to do more original work."

Problem 2. One student who had planned to spend only the usual amount of time at his work on a certain day but really to do twice as much work that day as usual, so he would not have to work the next day, got the following results:

He visited the railroad stations at Bloomington each day in order to get people to take certain motor-ability tests which were definitely standardized as to method and time of performance. Subjects had to be found, interested in the experiment, instructed, and tested in a very exact and uniform way in eight types of movement. In his attempt to get an objective measure of the actual value of planning, this student planned on a certain day to test as many people on these motor-ability tests in *one* day as he normally did in two. He found by referring to his records that he had tested on the average 10 persons each day for the past 15 days. He wrote in his account of this experiment:

I therefore planned to test 20 individuals on the following day but not to spend any more time for this particular part of my day's work than normally. I actually tested 27 persons the next day in the same identical manner as on the days when I was able to test only 7 or 15 persons.

A Japanese student said, "Such a definite purpose and plan serves as an incentive to drive my heart and hands, but the success of such a plan becomes even greater when there is provided a reward in which one has a fervent interest."

Another student who planned to do a fourth more work on a certain day said in her written account of this experiment:

On this particular morning I went shopping and marketing with a definite idea as to what I wanted,¹ and finished it in less time than I had planned. I then went to the Library to outline a book. I finished this book in less time than I expected and found I had considerable time left to put upon my experiments for this course.

¹ This student had charge of the home-economics department in the Bloomington schools.

All this work seemed to be done with greater ease than usual. My extraordinary results may not be due entirely to my plan to do extra work. The value of the plan which I made in order to complete this extra work was evident. It was my determination to do the extra work that made me plan my procedure more carefully. This better plan coupled with my determination to do the extra work seemed to facilitate all my tasks and enabled me to direct my energies and mind more successfully.

Another student in discussing his results wrote :

It was surprising to me to learn how much I could get done when I was determined actually to go over the top. In the first place I was careful to have on my plan for the day, in the best possible order, approximately one-fourth more work than it had been my custom to do. This I determined by a careful study of what I had been accomplishing each day for several weeks. I had already profited considerably by the special instructions given me on planning. But on this particular day the mile posts which I reached by completing definite tasks seemed to encourage me more than usual. I was also helped greatly by the thought that I did not have to worry one moment about what to do next or whether this was the best thing to do. I rested easy over these matters because I was sure I had planned my work at a time when I had the broadest and sanest perspective. This was a great incentive itself, for relief from responsibility is a great incentive.

It also happened that on this particular day I had planned definitely to finish a certain report which I had postponed several days because I dreaded it. This caused me to omit it from my previous schedules. I was much surprised how easily this dreaded task worked in as a part of my plan today. I also included in my plan for the day two outside tasks of about one hour each.

When I got through I did not feel as fatigued as usual, probably because of the pleasing and happy attitude that was created by the fact that I was getting this report out of the way and doing these other problems (because of my definite plan) immediately after they were assigned instead of dreading them, putting them off, and losing much time by procrastination. In other words I was profitably using the energy today which had hitherto been lost because

it was spent in a totally negative way. I find that such planning as I did in this experiment not only enables me to direct my energy and powers better but to conserve them as well. It was great fun and a sort of recreation to realize that I was getting so much of my work behind me.

Problem 3. In discussing her results on this problem one student said :

I planned this week to finish all these assignments on Tuesday night. I am not yet through with all my reading but have completed the experiments. I found that more time was required than I had allowed in my plan because of the new calculations I had to make. But the fact that I had a definite aim enabled me to keep this goal in mind and made it easier to work toward it.

Problem 4. The practical value of such a goal or definite plan is more definitely shown by the results obtained in solving Problem 4. Typical statements from the students' reports on this problem are the following :

I have for some time jotted down on a three-by-five card each morning the things I wanted to do that day. I find that I can do more work and do it much easier by definitely listing my tasks in this manner for the day and by determining in this way the order in which they are to be done.

Another student made the following statement about his results :

The days I used for this experiment were Thursday and Friday, July 19th and 20th, because I was able to control the conditions perfectly on those days. I found that I accomplished more work in a shorter time than usual on these days. I also seemed to do it with the expenditure of less energy ; at least I did not feel so fatigued as I ordinarily do and my work seemed to be done more thoroughly than usual.

In his interpretation of his results this student said :

It usually is a matter of great concern for a student to be doing the right thing at the most appropriate time. This in general con-

stitutes quite a hindrance for me, especially when I am changing from one task to another. But all this worry and strain was obviated today by the plan I followed in this experiment. This plan, which I worked out when I was at my best and in a position to get the best perspective of my day's work, enabled me to go confidently from one task to another as though I had no responsibility in my choice, being responsible only for the quality of the work I turned out.

The strain caused by extra responsibility is no small factor in our work. Every time it can be obviated or minimized it is profitable to do so. That it is very fatiguing is demonstrated by the many nervous wrecks produced by nothing more than continued responsibility without an assurance of wise and efficient discharge. Moreover, when one is fatigued by his work he certainly cannot be at his best for planning, and a knowledge of this fact acquired by experience causes the extra worry and strain and the consequent using up of our energy.

By carefully planning our work it can actually be accomplished. This gives us a new incentive every time a mile post in our plan has been passed or a task completed. In general we can do better if we know we are succeeding. This information was given me in the present experiment. The day always seems to go wrong if we do not have something big in the way of achievement to show for our efforts. We may have actually accomplished much, but it may not appear. It is here where our planning helps us. We can at the beginning of the day better evaluate the things which we have to do. Then as we do them we check them off, and though they may appear to be insignificant they are all necessary and a part of our plan. We, therefore, come to feel that we have accomplished something important or necessary. Moreover, we have succeeded in our attempt, a very reasonable thing to do when our plan has been carefully made. By this success we have proved to ourselves that we have done something important. And what could be a greater incentive to urge us on than to be modestly confident that we have succeeded already?

Our plan therefore provides a way of measuring our successes. It is an objective measure of something completed and a guide for doing the next best thing and therefore an added stimulus to urge

us on. The absence of the worry and strain caused by wondering what to do next adds to our supply of energy, whereas, before, extra energy was consumed by trying to decide what to do next. Above all there is a definite and tangible objective held out before us in the form of the last item in our plan, which makes us conscious of the end of our day's work. This we hold in view as we work and can see that we are definitely approaching our final goal with the completion and marking off of each succeeding task as it is finished. This serves as another incentive to urge us on, and helps to keep us more constantly applied to our work until it is completed in record-breaking time.

Another value of such a definitely formulated plan is hinted at by the following sentence taken from the written account of a Japanese student's results on this experiment. He wrote :

As you stated in your lecture, we must not develop the habit of failure. I think this a very important fact and take it very seriously. In planning any kind of work we must always prepare the road to success. This may best be done by wiser planning. A definite plan and specific goals, such as are provided in this experiment, help one in developing the habit of succeeding with all his tasks.

4. HOW THE MOST HELPFUL SCHEDULES ARE MADE

In order to make a perfect plan for your work as a whole, you must have reliable standards for each thing to be done. When a schedule for a train is made up, the train to be scheduled must be run over the road many times to ascertain how long it takes to make the run from one station to the next. After this has been done under all sorts of conditions and a careful record kept of the time actually consumed, the schedule is made on the basis of the facts so determined, which the conductor and engineer are supposed thereafter to follow to the minutest detail.

In a high-school or college department certain things must be done each day and week. After careful consideration and considerable experimenting a schedule of work is made for each day, each week, and for the semester and year. This schedule is then followed in detail by all. The tasks of each teacher and official are then further planned by *him* in order to save time and energy in doing his part of the total day's work. In such manner is the work of the world prepared for and done.

All students should, therefore, not only schedule their tasks and work but carry the principle one step further and apply it to the performance of each important task, such as preparing the assignment in a particular subject each day, getting ready for school, getting from his home or room to the first recitation on time, getting up each morning and preparing for breakfast, etc. Many persons take two or three times as much time for doing such routine things as is necessary. Where this is done they have simply wasted the extra time they consumed.

Many studies have been made of particular tasks in order to find the best procedure to follow in their performance and to determine how much time should be consumed in doing the work. This is done by keeping an accurate account of the actual time consumed in taking each step that must be taken. The best *method* of performing the task is determined by making a careful analysis of the task itself to ascertain just what the worker must do to succeed with this particular feat, as was described in the preceding chapter. In this way the necessary steps are determined and also the most economical way of taking each step required to perform the task. It was in this way that Gilbreth analyzed the process of laying brick and found that he could increase the workers' efficiency about 400 per cent.¹

In a similar way any worker may analyze each of his tasks

¹ See Chapter XI, pp. 212-216.

one at a time, to determine the best procedure to follow in doing that part of his work and also to determine the time that should be allowed for its performance. By this method a detailed plan could soon be worked out for all one's regular tasks and much time and energy saved. Such studies would reveal to the worker (1) how to reduce the number of movements or processes used in performing each task; (2) how to increase or decrease the speed of the movements required to get the best results; (3) how to discover new ways of doing that particular thing, and how to originate new and better methods of work.

But in making such plans or in revising your present schedule you should start with only *one* operation or routine task. This should be carefully studied and standardized before another is taken up. You should plan your work for the entire day and week as best you can, arranging a *tentative* schedule for all the tasks that have not been standardized. Then by making a careful study of each important division of your work you should collect the facts needed to enable you to standardize *all* your important *routine* tasks and to schedule your work as a whole. You probably already know exactly how much time is required to get you ready for school and to get there after you start. You should not only know how much time is required for this part of your day's work but see that no extra time is consumed in doing it. When all or most of your *routine* tasks have been standardized in this way an efficient and workable schedule for your work as a whole may be made.

5. MAKING A TENTATIVE SCHEDULE FOR YOUR WORK

You are now ready to prepare a tentative working schedule for your tasks. Do this by indicating in the appropriate spaces in the blank schedule shown at the close of Chapter II, p. 38 (Form III), how you propose to spend all your time for one week. Make this schedule show exactly what you propose to do each

hour, such as studying history at nine o'clock, reciting English at ten, going home for luncheon from twelve to one, sleeping from 10 P.M. to 6 A.M.; going to a show on Saturday afternoon from two to five o'clock; attending a party or dance on Friday evening from eight to eleven, etc. In preparing this schedule you should get counsel and help from your teacher or from anyone who can assist you in making or revising your present schedule of work. After this *tentative* draft has been made, examine it carefully to see whether it is really workable and whether the right proportion of time has been allowed for such items as meals, sleep, study, recreation, and productive work.

After this *tentative* schedule is completed, keep an accurate record of how it works. No plan is worth anything to you unless it will *work* and assists you in doing the things that you desire to do.

When such a tentative schedule has been made and tried out, you may proceed to standardize some of your specific tasks in the ways described in Chapter XI; for example, the time that should be devoted to sleep each day, to recreation and play, the kind of relaxation that will enable you to conserve your energy best while engaged in your regular work, the time you may devote to outside work, planning how to spend the time and energy you have saved by learning how to plan your work more efficiently, and the like.

You should try, however, to standardize *only one* thing at a time, working this out correctly *before* taking up another point. Remember that learning to work in an effective way is in a sense a *life problem* that must be worked at for many years and that you are here merely learning how it may best be done and trying to make a start in solving this problem, by learning how to plan your work in an effective way. Take up your routine tasks, beginning with the one that must be done most often. Continue your efforts at standardization and scheduling until an economic schedule can be made.

6. PRACTICAL EXERCISES IN PLANNING

As an experiment in planning that would help to establish the habit of planning, and at the same time greatly increase your personal efficiency, some or all of the following exercises might be undertaken *one at a time*. It should be remembered, however, that each suggestion represents a real problem for the learner that can be solved only by considerable practice and by careful experimentation to determine just what should be done. Some of these problems have already been assigned and should here be reviewed and standardized.

EXPERIMENT XI

Problem 1. Plan to give more careful attention to the selection of your food, both as regards the kind and amount that should be consumed. Most persons die from overeating or from an unwise selection of their food. The greatest care should, therefore, be exercised not only in the selection of your food but in preparing for its proper mastication and digestion, as was described in section 11 of Chapter IV. A short period of rest should be planned both before and after each meal. The human machine wears out because people do not obey the most basic laws of health.

Problem 2. Plan to determine just how much sleep you need to keep your mind and body in the most efficient condition for work. This problem was first assigned in Experiment III. A large percentage of the freshmen students attending Indiana University in 1924-1925 took more hours of sleep than they said they needed. You may, therefore, be establishing a habit of sleeping more hours than you need for recuperation and rest. You may have developed a habit of light and fitful sleeping that does not rest you, or you may not be devoting enough time to sleep for complete recuperation. You should, therefore, plan to determine how much sleep you actually need and how to get the most rest during the time you devote to sleep.

Problem 3. The same thing may be said in regard to the time you devote to physical exercise and play. This should be as care-

fully planned for as the accomplishment of your regular tasks. How much exercise and recreation do you need? Do you take more than this amount, or do you take so little that you are troubled with headaches, poor circulation, loss of appetite, and inefficiency in your work? Is the recreation you take of the kind that will really re-create all your mental and physical powers? Do you carry on your exercise and play in a way that rests you and builds you up, or do you take your exercise by aimless walking, in poorly ventilated rooms, or in a club or pool room so thick with smoke that your recreation further reduces the energy you should be restoring by the rest?

You should plan to develop habits of healthful activity, habits that will keep your mind and organism in the best possible condition for enjoyment and work. Such habits can be established only by careful planning, as has already been shown. A student may, for example, find his recreation in dancing, in card playing, or in other kinds of social activities. He may get it by reading, by going to a "movie," to a lecture, to a concert, by riding, walking, swimming, and the like. Both the amount of time spent in such recreational activities and the *way* it is spent are important. It is entirely possible to spend the time in any one of these types of amusement in such a way that no real benefit will be obtained. You must therefore plan to make your exercise really recreational to make it worth your while. If you go to a show and think about the examination you must take the next day most or all of the time you are there, you might just about as well be in your room preparing for the test.

Problem 4. You should also plan to determine the most helpful types of *relaxation* to take in connection with all your tasks and work, as was set forth in the discussion and experiments contained in Chapter III. The advantages of such short periods of rest taken during long periods of continuous work have already been pointed out. In a study of the present methods of work of fifteen hundred college students it was found that the average length of time that these students could continue a difficult task before becoming too fatigued to do effective work was one hour and a half. Yet many students who had formed the habit of taking regular periods for relaxation reported that they could work five, six, and even

eight hours without becoming too fatigued to do effective work. Each student and worker should, therefore, plan to determine the most helpful periods of time to devote to relaxation and then arrange to take these short periods of rest for complete relaxation of their bodies and minds. For in no other way can the greatest human efficiency be obtained.

Problem 5. It is also important to determine by careful planning and experiment how much work you can do each day. You should not overtax nor yet undertax your strength by what you plan to accomplish or undertake. The former will undermine your health and destroy your personal efficiency permanently if it is kept up. The latter keeps you from doing your best by developing habits of laziness that prevent you from getting from your life *all* that is possible for you. You should, therefore, plan to determine your real capacity for work, then adjust your plans and tasks to your ability and strength.

Problem 6. You should also plan to use the best materials and equipment you can get to aid you in your work. Many students lose far more than they gain by not providing themselves with suitable materials and equipment for their work. They fail to purchase a book which they need every day or try to work with poor or inefficient tools that retard their progress and keep them from doing their best work.

7. PLANNING TO USE ALL THE TIME AND ENERGY YOU HAVE SAVED

Problem 7. Lastly, each student and worker should plan to use in an effective way all the time he has saved by better planning and by using improved methods of work. This is more important than it at first appears, for all fails if the time and energy saved by increased efficiency are not properly used in doing new and worthwhile things.

(1) *Value of a Small Margin of Energy or Time*

In Chapter III we called attention to the immense value to the individual and to a species of the small residuum of energy at a creature's disposal over and above that which is needed

to carry on the normal processes of life. This margin, as was there pointed out, is exceedingly small; yet all that the race has achieved in music, in art, in literature, in science, in government, and in other fields of human endeavor is due to the use which the individuals of succeeding generations have made of this small margin of energy. The same thing may be said for the small margin of time which a student or worker manages to save. Everything depends upon what is *done with* the time that you have learned to save by planning and by the use of more efficient methods of work.

Harrington Emerson in discussing the money value of one hour's time says :

An hour is like a clean, white piece of paper, its value depending entirely upon what is done with it. One man rolls his bit of paper and uses it as a taper with which to light a cigarette. Another tosses his carelessly aside. A third may use his slip of paper to forge a note or a check. The poet writes a few lines of immortal verse upon his, while an artist may paint a water color on his sheet, thereby making himself famous and giving pleasure to thousands. . . . So it is with an hour's time. One man spends it in hurtful dissipation. Another wastes it in idle talk. Here is a man who uses his hour to commit a crime; another uses his to do an act of kindness. In less than an hour Abraham Lincoln wrote his Gettysburg speech, which is immortal.

The value of the hours and of the energy which you save depends, therefore, wholly upon the use that is made of them. There was an hour in the life of every great man and woman when they conceived the idea which made them famous and of supreme service to the world. Each reader of these lines should, therefore, begin at once to *plan to use* in the most important way he can conceive *all the time and energy* which he can manage to save.¹

¹ See also Chapter XXII below, section 3.

(2) *Some Practical Suggestions for the Use of the Small Margin of Energy and Time which you have learned to Save*

Everyone will find many odd minutes at his disposal each day. There is the time one must wait when a train or car is behind its schedule. Sometimes a meeting is delayed in opening or a class is dismissed, or one may be obliged to sit in a reception room while waiting to see someone on business. He may spend from ten minutes to two hours in going to or in coming from his work each day. No matter who we are, or what we are doing, such odd minutes in the day's schedule are inevitable. Unless one plans to utilize them, they are wasted and gone forever. Every student and worker should therefore make it one of the exercises in connection with the study of the principle of planning, definitely to plan for the use of these odd minutes.

Suppose you spend in this way only thirty minutes each day. This means three hours per week, omitting Sunday. Three hours per week is one hundred and fifty-six hours a year. It is said that all the world's greatest and best literature is contained in a hundred books. You could read these hundred books thoroughly in a thousand hours, or a little less than thirty-two months, at the rate of one hour's study each day.

These are only short periods of time, but every college and high-school student has not only one year, but five, ten, twenty, thirty, or perhaps fifty years at his disposal. Think what could be done in this time if only you planned to use your leisure time and would learn to work in a manner that would increase this leisure from year to year. If you would only plan to use in a profitable way the half-hour a day which now escapes you in the form of "odd moments," you would in fifteen years save 2347 hours, not counting Sundays. This is equivalent to 293 days of 8 hours each, or about the number of working days in a year.

Moreover, the psychological effect of such planning and its opposite is one of the most vital factors in success because of the effect which these leisure hours have upon the formation of your habits of life. In the one case you will be a time saver and a contributor to your community and age. In the other you will be developing habits which will eventually make you a time killer and somewhat of a parasite in the world.

(3) *Specific Ways in which a Small Margin of Energy or Time may be Used*

There are, of course, many ways in which a student or worker may profitably spend all the time and energy which he has managed to save by developing more effective methods of work. Some of these ways should be enumerated for the guidance of students and workers.

1. First, they may be spent in legitimate enjoyment or in taking the needed recreation and rest described in Chapters III and IV. Students in college and high school often neglect both of these things. Charles Darwin so neglected music and art for thirty years that he completely lost, through the operation of the law of habit, his power to appreciate the beautiful things in these fine arts, thereby narrowing his life and failing to obtain that richness of experience which every normal person should seek to obtain. High-school students must often give up their music and other important things in which they are interested because they lack the energy and time to do these things in addition to their regular school work. Many college students, on the other hand, fail to get the polish and benefit that come from the social life of these important formative years. Or they may put all their time and energy into the enjoyment side of their college life, neglecting the more important things for which they came. In either case the time and energy saved by the use of more

efficient planning and better methods of work could be put to the best of use by every ambitious student.

2. A second way in which a student or worker might utilize the time and energy which he is able to save is to do more or better work along the line of his present occupation, thereby saving much time in completing his college or professional course. As a rule no limits are now placed on the rate at which a student may go in completing his high-school or college course.

For other workers this extra time might be used to advantage in preparing themselves for an occupation which they propose to follow as their life work, but which they had to abandon temporarily because they had to stop to make the money needed to prepare for what they wished to do. A similar thing could very well be done by a student who is completing a regular college course and who later intends to take a professional course. The spare time of such a one could profitably be spent on outside work which relates to this profession.

3. One's extra time and energy may be devoted to a purely avocational line. No individual will be as efficient if he devotes *all* his time and attention to his regular work as he will be if he has some outside interests to take him entirely away from his regular field of work. And it may be well to call the reader's attention to the fact that some of the most important discoveries have been made in every field by men and women who cultivated such outside interests. It will, for example, be remembered that Mendel, the monk, made one of the most important contributions to the biological sciences through his culture and study of common peas, and that many of the most important discoveries in all sciences have been made by the men who made their living by teaching these sciences to undergraduate students.

In fact, the biographies of the most noted men and women

show that their best contributions have often come from the uses they made of the extra hours which they saved from their regular occupation and which they planned to use in doing some of the important things which they wished to do. Shakespeare was a theatrical manager and actor, yet he made his greatest contribution through the plays which he wrote during the hours he was not engaged in his regular work. Charles Lamb and Nathaniel Hawthorne made their living by working as clerks, but spent their spare hours in writing and in studying literature. Robert Burns was a farmer and a tax collector. Oliver Wendell Holmes was a physician. Franklin learned to write good English during his off hours while working in a print shop. Abraham Lincoln spent his leisure hours studying law and reading the Bible. Whitney, the inventor of the cotton gin, taught school, but studied mechanics when he was not employed in the schoolroom. And so we might go on with many hundreds of names. In other words, the people who have made the most important contributions to the world in every line of human activity are those who have somehow learned how to work in an effective way and by careful planning have saved much time and energy which they devoted to doing what they wanted most to do. By using the time which most persons waste, they succeeded in making themselves more ingenious and capable of doing real creative and original work which made them famous.

You should therefore plan to capitalize all your energy and leisure time. Nothing in the whole field of planning or in life is more important than the use one makes of his leisure time. *You should begin at once to plan what you are going to do with the time and energy that you save by your study of the principles set forth in this book.* How much time each day have you saved since you began the study of this book? Suppose you saved no more than that, how much will it aggregate in a week, a month, a year, five years, ten years? What are the possibilities of so much time profitably employed?

It does not so much matter whether you plan to use for self-improvement in your present work the time you have learned to save or use it to cultivate interests outside your present occupation or field of work. Every student and worker should really do both; that is, he should dig more deeply into his present work, and also broaden his interests by taking up things that fall outside the pale of his present occupation. The important thing is to plan and schedule your tasks in such a way that you will have more time and energy for doing the things you really want to do. But unless you definitely plan to use this extra time in doing something that is really worth while, something that will help you to realize some of the ideals that you formulated in the exercises given you in Chapter VI, no real progress in personal efficiency will be made. Much of the time saved should be devoted to cultivating your initiative and powers of original thought, to making yourself more ingenious and creative in your thinking and work, as will be pointed out more in detail in Chapter XXII.¹

EXERCISES AND QUESTIONS ON THE TEXT

1. What is meant by making a schedule for a particular bit of work? Illustrate.

2. What is the general value of such definite planning? (See sections 2 and 3.)

3. In what way is the principle of scheduling related to the job-analysis discussed in Chapter XI? to the standardization of specific tasks?

4. How must one proceed to make a workable schedule for his tasks and work?

5. How may one's tentative working schedule be improved?

6. How should one proceed to establish the habit of making such definite plans for his work? (Compare section 6.)

7. How may one plan to use in a profitable way all the energy and time that he has learned to save?

¹ Compare on this point the discussion given in Chapter XXII.

8. Point out the true value of a small margin of energy or time.
9. In what different ways may such a small amount of energy or time be used?
10. Name and briefly explain four ways in which the habit of making detailed plans for your work may be exercised.

REFERENCE

EMERSON, HARRINGTON. Twelve Principles of Efficiency, chaps. viii and x. Engineering Magazine Company, New York, 1917.

CHAPTER XIII

WORKING ACCORDING TO A DEFINITELY FORMULATED SCHEDULE OR WRITTEN PLAN

After a successful working plan has been made it should, of course, be promptly dispatched. This execution of your plan is the most important step in the entire program of planning. When a boy, the author saw the following motto tacked on the desk of a prominent man: "Blessed is the man who has found his work. Twice blessed is the man who is happy in his work." To which should really be added: "Thrice blessed is he who *does* his work." This calls special attention to the necessity of working your plans, for nothing counts unless your plan is successfully carried out.

For economy in the execution of your plan it is helpful, often necessary, to prepare a definite set of rules or practice instructions for carrying out your schedule. In fact, when one's tasks become very complex or when he wishes to save as much time and effort as possible, a worker ceases to try to carry his plan in his head and not only writes it out in detail but explains how it should actually be carried out, as is done by every architect and engineer when he presents his plans and specifications to a builder, who is expected to follow it in detail.

1. MEANING AND PLACE OF THE PRINCIPLE OF PREPARING PRACTICE INSTRUCTIONS FOR YOUR WORK

When the author was in college he had to earn enough money during his summer vacations to continue his studies for the following year. This he did by selling books. Before

starting out on this venture he was careful to select an article that seemed so good that most prospective customers would buy it as soon as they could be shown what it was. He then made careful preparations for his selling campaign and tried to master all the suggestions given in the prospectus sent out by the company. After this preliminary preparation he started for a neighboring town confident of his success, for he believed the article he was selling was of such great value to his prospective customers that they would buy it almost as soon as they saw it. But three days of hard work netted so few results that he was paralyzed with disappointment and the fear of utter failure in his undertaking.

Finally, on the afternoon of the fourth day he took a walk into the country, lay down under a tree to rest and to determine what to do next. He decided that there must be something wrong with his method of approaching his customers and with his sales appeal. So he began writing down on a card every reason he could think of why his prospective customers should buy this particular set of books.

When he had finished this list of reasons he went over what he had written and tried to state each one of these reasons in the most attractive, alluring, interesting, and convincing manner possible. He then arranged his statements in logical order and rearranged them several times until he was convinced that he had them arranged in the most effective way. The next morning he went over the entire appeal, strengthening it here and polishing it there and adapting it more closely to the ideas, prejudices, and temperaments of the individuals he had been interviewing. He also gave special attention to the problem of selecting his prospective customers and to the matter of making a more favorable and dignified approach in each case.

When he had finished this work, he had a carefully prepared and partially standardized set of written instructions for his task which he determined to follow in detail. When he took

up the task of selling his books that afternoon, he sold more in half a day than he had sold before in half a week, and he kept up this rate of success as long as he continued on the job.

No matter what task you have to perform, selling goods, preparing an assignment in psychology, applying for a position, asking for a promotion, presenting a proposition to your fraternity or to a judge and jury, seeking a political office, preaching to a congregation, finishing your high-school or college course with honors or distinction, you may standardize your plan of procedure in a similar way by preparing definite instructions for the performance of your tasks that will be just as serviceable to you as were the instructions prepared by the author for selling his books.

2. GENERAL SCOPE OF THE PRINCIPLE

The achievements of the race in science and in other fields of human activity are formulated in terms of language or other formulæ and preserved for the guidance of the present and future generations. Because we try out what we have learned, and carefully write down and preserve the results of our investigations and experiences as individuals and as a race, we are able to profit by the experience and experimentation of all who have lived before us. This enables us not merely to preserve the past achievements of the race in every field of work but to stand as it were on the shoulders of the past and to use these achievements as a starting-point for making new discoveries and advancements of our own.

Textbooks in any science or subject merely tell us what is true in that subject or field. All religions and the various political and personal creeds are nothing more nor less than *standardized* instructions in these fields, which have been devised, verified, and used by the race for the guidance of its conduct.

Schaff in his remarkable historical account of the *Creeds*

of *Christendom* has shown how the religious experiences and beliefs of the race, over which the nations of the earth have fought until every word in the creed represents literally a stream of blood, were preserved in this way, carefully written out, and then taken as a rule and guide to the conduct and faith of the nations of the earth. In like manner our state and national constitutions and our international agreements and covenants represent definitely formulated plans carefully worked out and formulated in order that they might serve as a guide for the conduct of individuals and nations on the particular points treated in these documents.

In fact, the principle applies to everything that people do. An architect makes a definite plan for building a million-dollar structure, also for constructing the mantel to be placed in a particular room. He makes out detailed plans and specifications for constructing every part of the building. These specific plans are then carefully written out so that they may be followed in detail by the builder just as prepared by the man who conceived and formulated them. For a very small project the builder may carry the plans and specifications for his work in his head instead of writing them down on paper before he begins to work. But such a procedure has been found to be very wasteful and to result in so many unnecessary mistakes that the former plan is now generally resorted to even for the smaller tasks. In the performance of all our tasks it has been found to be most economical and efficient to formulate such practice instructions for our guidance. This is true because they may be followed, if carefully written out, without error or waste of materials and effort.

The principle also applies to one's life work taken as a whole, and to the performance of his personal tasks. Whether we direct others or merely ourselves, it has been found to be economical to reduce one's plans, when carefully thought out, to writing, as was done by Mr. Gulick in the story told in Chapter I of this book. After he had worked out a plan for

his boy friend to win the swimming-under-water contest, their plan of procedure was carefully written down so that it would not be forgotten and could more easily be followed exactly as they made it. In all scientific investigation the method and technic used in the discovery of new truths are also carefully written out or explained so that the exact procedure followed may be clearly understood and the results verified by repeating the experiment.

3. HOW THE PRINCIPLE MAY BE USED FOR SELF-IMPROVEMENT

One of the best illustrations that can be given of how the principle of formulating such written instructions for carrying out your plan may be used in the performance of one's personal tasks or in attaining his desires is the method used by Benjamin Franklin in striving for moral perfection. He says in his autobiography :

It was about this time that I conceived the bold and arduous project of arriving at moral perfection. I wished to live without committing any fault at any time ; I would conquer all that either natural inclination, custom, or company might lead me into. As I knew, or thought I knew, what was right and wrong, I did not see why I might not always do the one and avoid the other. But I soon found I had undertaken a task of more difficulty than I had imagined. While my care was employed in guarding against one fault, I was often surprised by another ; habit took the advantage of inattention ; I concluded at length that the mere speculative conviction that it was to our interest to be completely virtuous, was not sufficient to prevent our slipping ; and that the contrary habits must be broken and good ones established before we can have any dependence on a steady, uniform rectitude of conduct. For this purpose I therefore contrived the following method. The names of the virtues with their precepts, were :

1. Temperance — "Eat not to dullness ; drink not to elevation."

2. Silence — "Speak not but what may benefit others or yourself, avoid trifling conversation."

3. Order — "Let all things have their places; let each part of your business have its time."

4. Resolution — "Resolve to perform what you ought; perform without fail what you resolve."

5. Frugality — "Make no expense but to do good to others or yourself; i.e., waste nothing."

6. Industry — "Lose no time; be always employed in something useful; cut off all unnecessary action."

7. Sincerity — "Use no hurtful deceit; think innocently and justly; and, if you speak, speak accordingly."

8. Justice — "Wrong none by doing injuries, or omitting the benefits that are your duty."

9. Moderation — "Avoid extremes; forbear resenting injuries so much as you think they deserve."

10. Cleanliness — "Tolerate no uncleanness in body, clothes or habitation."

11. Tranquillity — "Be not disturbed at trifles, or at accidents common or unavoidable."

12. Chastity — "Rarely use venery but for health or offspring; never to dullness, weakness, or the injury of your own or another's peace or reputation."

13. Humility — "Imitate Jesus and Socrates."

My intention being to acquire the habitude of all the virtues, I judged it would be well not to distract my attention by attempting the whole at once, but to fix on one of them at a time; and, when I should be master of that then to proceed to another, and so on, till I should have gone through the thirteen; and, as the previous acquisition of some might facilitate the acquisition of certain others, I arranged them with that view as they stand above.

I made a little book, in which I allotted a page for each of the virtues. I ruled each page with red ink, so as to have seven columns, one for each day of the week, marking each column with a letter for the day. I crossed these columns with thirteen red lines, marking the beginning of each line with the first letter of one of the virtues, on which line, and in its proper column, I might mark, by a little black spot, every fault I found upon examination to have been committed respecting that virtue upon that day.

I determined to give a week's strict attention to each of the virtues successively. First, in the first week, my great guard was to avoid every least offence against *Temperance* leaving the other virtues to their ordinary chance, only marking every evening the faults of the day. Thus, if in the first week I could keep my first line marked T, clear of spots, I supposed the habit of that virtue so much strengthened, and its opposite weakened, that I might venture extending my attention to include the next, and for the following week keep both lines clear of spots. Proceeding thus to the last, I could go through a course complete in thirteen weeks, and four courses a year. And like him who, having a garden to weed, does not attempt to eradicate all the bad herbs at once, which would exceed his reach and his strength, but works on one of the beds at a time, and having accomplished the first, proceeds to a second, so I should have, I hoped, the encouraging pleasure of seeing on my pages the progress I made in virtue, by clearing successively my lines of their spots, till in the end, by a number of courses, I should be happy in viewing a clean book, after a thirteen weeks' daily examination.

4. GENERAL VALUE AND PURPOSE OF SUCH WORKING INSTRUCTIONS

Such written instructions for carrying out your plans are valuable to a worker for the following reasons: (1) They give definiteness and direction to his purposes and efforts. (2) They present in a definite, concrete, and practical form the results of his own study and thought concerning the tasks to be performed, also the results of the observations and experience of others that should regularly be embodied in making his plans. (3) They crystallize and make practical the results of such study, thought, and experience. (4) By having the things to be done presented in a definite and tangible form he is able to keep a more definite and reliable record of his successes and failures and so to learn exactly what he can do. This enables him to standardize the performance of all his tasks, including his attitude toward his work taken as a whole. When such a

plan has been made and definitely formulated, a worker needs to think only of how to do his work or of the quality of the work. The question of what is best to do or what should be done next need not be raised. (5) Such definitely formulated plans also prevent one from slipping back from what he has already achieved, because he has a definite record not merely of what he has done but of his success in its performance. Lastly, (6) such definitely formulated written plans add to the worker's interest, zest, and enthusiasm.

Many of our tasks require a great deal of drudgery and the application of much monotonous effort. Special incentives are therefore needed to keep one fully and continuously applied to his work or to interest him in obtaining better results. In fact, it is often necessary to increase in this way one's enthusiasm for the work he is doing, and to strengthen his interest not only in the work but in the problem of learning to do it always in a more efficient and economical way. This particular point will be further discussed in Chapter XVI.

5. PSYCHOLOGICAL SIGNIFICANCE OF MOTTOES AND SLOGANS

The practical value of a *written* plan for the establishment of desirable habits is further shown by the universal use that has been made of mottoes, slogans, resolutions, and creeds. Many examples might be given of the dynamic effect of a motto or slogan, or of a definitely formulated resolution or creed, especially if they are kept continuously before one's eyes or mind. Examples of mottoes and slogans that are used to influence human action and conduct today are the following: "Do it today," "Keep smiling," "The customer is always right," "Write Smith today," "Plan your work, then work your plan." Others that have been successfully used to influence the thought and action of the entire country are "He kept us out of war," "Back to normalcy," etc.

One of the most valuable things that a student who desires to make himself efficient in a certain line could do would therefore be to select a few such mottoes and one or more well-formulated creeds that fit in definitely with his life purpose or highest desires, and then keep these slogans constantly before him as an incentive while he works. Such a procedure would urge him on to greater and more continuous effort specifically directed toward a definitely formulated goal.

The practical and psychological effect of such resolutions and definitely formulated plans is hard to estimate, and far exceeds the expectations of those who do not understand the psychological laws that control one's ability to release and direct human energy in study and work. As one of the author's students expressed it :

Just as the eye is caught by a bright color, the ear by a loud noise, so is the mind caught and held by an apt phrase. "Keep smiling" brings a smile to most people's faces. It at least shifts for an instant one's line of thought. "Safety first" has saved many lives by causing automobilists and others to watch for the trains. . . . Such mottoes and slogans not only catch one's attention at the present moment, they have a tendency to recur to mind when they are most needed. "A stitch in time saves nine" often comes to my mind when a button is loose on a glove or a rip comes in my clothing.

Another student said :

Years ago I taught school and "Speak softly" was a motto which I used with remarkable effect. I found that the soft tone of the teacher brought a soft-toned answer in response. "Do it now" was another motto that I used with remarkable success. I had a tendency to think that "later" is a much less crowded period of time than the present. The motto "Do it now" enabled me to substitute the good and efficient habit of acting promptly for the habit of putting everything off until tomorrow that could possibly be shifted to a later date.

These quotations show why mottoes produce valuable results.

6. PRACTICAL VALUE AND SIGNIFICANCE OF RESOLUTIONS AND CREEDS

Each student and worker who desires to make himself truly efficient should, therefore, collect one or more resolutions or creeds that state exactly what he desires to do, and then keep them prominently before him until the desirable habit is established. The following creed quoted from Harrington Emerson is an example of the sort of thing that is meant:

I AM DETERMINED

To respect my work, my associates and myself ; to be honest and fair with them as I expect them to be honest and fair with me ; to be a man whose word carries weight ; to be a booster and not a knocker, a pusher not a kicker, a motor not a clog ; to base my expectations of reward on the solid foundation of service rendered ; to be willing to pay the price of success and honor ; to look upon my work as an opportunity to be greeted with joy and made the most of, and not a painful drudgery to be reluctantly endured.

To remember that success lies within myself, my own brain, my own ambition, my own courage and determination ; to turn hard experiences into capital for future struggles ; to interest myself heart and soul in the achievement of results ; to be patiently receptive of just criticism and to profit by its teaching ; to treat equals and superiors with respect and subordinates with kindly encouragement ; to make a study of my business duties ; to know my work from the ground up ; to mix brains with my efforts ; to use system and method in all I undertake ; to find time to do everything needful by never letting time find me or my subordinates doing nothing ; to hoard days as a miser hoards dollars ; to make every hour bring me dividends in specific results accomplished ; to steer clear of dissipation ; to guard my health of body and peace of mind as my most precious stock in trade.

Finally to take a good grip on the joy of life ; to play the game like a gentleman ; to fight against nothing so hard as my own weakness and to endeavor to grow in business capacity and as a man with the passage of every succeeding day.

Of course there is danger that a learner may make the wrong use of such resolutions or creeds, assuming that all that is necessary is to make the resolution or to formulate his creed. As one student phrased it, "He may feel so virtuous or self-satisfied over having resolved or formulated his creed that nothing further will be done." But, as may be inferred from the discussion in Chapter IX, the creed is only a first step in the formation of the desirable habit. Nothing counts unless one's resolves and plans are actually carried out and the desirable habit practiced until it is established. It is even demoralizing and injurious to a learner to have the thrill of accomplishment or desire to improve in a certain direction without making the responses needed to carry out his resolves.

Every resolution, creed, standardized set of instructions, is therefore merely a means to an end. That it is valuable for attaining one's purposes has already been shown. That it is only a *means* to this end or an aid in attaining it, never an end in itself, must not be forgotten. Such a mistake is often made in the field of religion, where a religious creed is regarded as an eternally fixed theory or truth instead of as a tentative guide to one's conduct and faith or as a means of directing one's conduct and thought until he can make a wiser and truer formulation of a set of instructions to guide him toward the still higher and better things of life. A student and worker should, therefore, realize that any set of working instructions or creed that he may formulate, or that may be formulated for him, should be constantly improved. There should be no feeling of undue reverence for the instructions themselves, but an open mind that is always seeking a better method or plan for each task, and for his life work taken as a whole. As one of the author's students phrased it: "There should be no feeling of reverence for the instructions in themselves. An open mind is always seeking a new and better country, or a better way to reach an old one."

7. HOW THE PRINCIPLE MAY BE APPLIED TO THE IMPROVEMENT OF YOUR OWN METHODS OF WORK

The following plan modeled after Franklin's method was devised at the opening of a semester by one of the author's students in California and used throughout the semester as a set of written instructions for establishing certain desirable habits. She wrote:

I first made a list of the specific habits which I wished to establish during the year, somewhat as follows:

1. *Notes.* Read over lecture notes every morning.
2. *Notebooks.* Keep notebook work up to date by working a few minutes after supper each day.
3. *Laboratory.* Finish laboratory work in the time specified by the instructor.
4. *Papers.* Hand in all papers on time with your best work on them. Don't offer the professor an excuse.
5. *Study hour.* Keep strict study hours from seven until ten every day.
6. *Duty.* Never be late to class; attend chapel; attend class meetings and "cut" no class.
7. *Rules.* Violate none of the university rules; they were made after years of experience.
8. *Recreation.* Do not accept an invitation to go out at night unless the work for the following day is done.
9. *Rest.* Have lessons prepared so that Sunday may be used as a Holy day for religious contemplation and rest.
10. *Correspondence.* Write home regularly every Sunday and Wednesday. Write to at least one friend every week.
11. *Moderation.* Be moderate in the use of luxuries such as ice cream, candy, etc. Substitute fruit for candy.
12. *Expenses.* Keep a budget of every day's expenses. Keep within your allowance. Give yourself a certain amount to spend for each of your needs. Spend no more.
13. *Borrowing.* Neither borrow clothes, money, nor books.
14. *Attitude.* Keep calm. Never get ruffled or angry. Be careful

of your speech. Do not worry over grades, examinations, or any incident which has happened but which you cannot help.

15. *Jealousy*. Be not jealous of another's grades or progress. Do the best *you* can.

16. *Visits*. Limit your visiting hours, but visit someone in the dormitory or a friend each day.

17. *Truth*. Be truthful to your friends, to your teachers, to your work, and to yourself.

18. *Cleanliness*. Be clean in mind and body.

I next divided a sheet of paper into seven spaces, one for each day of the week. At the top of each column I placed the name of the day of the week. I next crossed these vertical lines with a horizontal line for each of the habits I wished to establish during the semester. On each of these horizontal lines I placed the name of the habit that I wished to acquire, and each evening before retiring I inserted a cross in the proper space for the day for each violation of any of these rules. And since concentrating one's efforts on a particular habit enables him to form it more quickly and to establish it more firmly than he would otherwise be able to do, I centered on these habits one at a time, and repeated the experiment for eighteen successive weeks, with the result that I was able to clear practically every line of all its demerit marks during the semester.

8. MEASURING THE VALUE OF PREPARING SUCH WRITTEN INSTRUCTIONS FOR CARRYING OUT YOUR PLANS

In Chapter XI you were asked to make a scientific analysis of a particular task in order to find the best way of performing it. The general procedure in all such investigations is to make, first of all, a careful study of your present method of doing this bit of work ; then to determine very accurately just what must be done to succeed and the best way of doing each of these necessary things. This involves among other things ascertaining how your present method of doing this work can be most advantageously changed and the whole process shortened and simplified. After the best method of doing a

particular task has been found it should be definitely written out for more ready reference and use.

As earlier pointed out, most workers and students have not developed the habit of making such analyses of their tasks. The author once saw a college student, who was assisting her mother in cleaning the house, dust the furniture and the window ledges before she swept the room. This, of course, meant that the dusting had to be repeated later on, because no thought had been given to the matter of determining the best method of doing that bit of work.

If you ride on a pay-as-you-enter street car, do you get your change ready for the conductor while you are standing on the corner waiting for the car, or do you annoy the conductor, embarrass yourself, and try the patience of those behind you by fumbling for the money or ticket while fifteen or twenty people are waiting for you to get it for the conductor?

If you are doing housework and have to clear the table and wash the dishes, do you first carry the soiled china and silverware into the kitchen, prepare and arrange them for washing, before you put the dishwater on to heat, wasting a quarter of an hour waiting for it? Or do you put on your kettle when you sit down to eat, so that the water will be hot as soon as you are ready to wash the dishes?

In each of these cases a mere change in the order of procedure would save time for you and others, and a very little study would reveal the best way of doing the task. And in such simple cases as these the best method may be followed without formally writing down the procedure for the performance of the task. But in complex operations or tasks it will be necessary to make a detailed analysis of the job and prepare a careful set of instructions for carrying out your plan to guide you in your work.

For the purpose of testing the value of preparing such written plans for your work try the following experiment and study carefully your results.

EXPERIMENT XII

Problem 1. To test the value of preparing a definite set of written instructions for the performance of particular tasks.

Method. Select some simple but important bit of work which you have to do many times and make a careful study of this task with the view of determining the best procedure to follow in doing it. When you have determined and listed each thing to be done and ascertained the best order and rate of doing it, write out in a form that will be most serviceable to you your plan for doing that particular thing.

Results. Compare the time and ease with which this task can be performed *after* this study and plan have been made with the time and energy expended in its performance *before* your analysis was made. What conclusions can you draw on the basis of your results?

1. Were you able to reduce the number of steps required for the performance of this task or the time consumed in doing it?
2. Did the fact that you had your plan of procedure all written out aid you? How much and how?
3. What other facts, if any, did you ascertain?

Problem 2. To test the practical value for personal efficiency of a motto, a slogan, or a creed.

Method a. Select a slogan or motto that expresses *exactly*, and in a clear and forceful manner, something that you want to do, or some habit which you desire to form. Write it out in a neat and attractive form and keep it on a card before you as constantly as you can for a certain period of time, noting carefully any effects which this procedure seems to have on your conduct or thought.

Results. Does it keep more definitely and constantly before your mind the thing to be done? If so, what effect does this have on your conduct and thought? Do you observe any other differences? If so, what?

Method b. Repeat the experiment, to determine the kind and amount of effect produced by a carefully worded creed.

Results. What practical effects does such a creed have upon your efficiency in doing what you wish most to do? What is the best way to keep this creed before your mind continuously enough to get the best results?

EXERCISES AND QUESTIONS ON THE TEXT

1. What does the principle of preparing a set of definite written instructions for carrying out one's plans really mean?
2. When and why should such detailed instructions for carrying out your plans be made?
3. To what sorts of things may this principle be applied, and with what results?
4. In what way or ways may the principle be used in learning how to work in the most effective way?
5. In what specific ways do such practice instructions aid us in doing our work?
6. Discuss the practical value and importance of a motto or slogan. Why do they produce such marked effects upon human behavior or conduct?
7. What in your judgment is the value of a definitely formulated resolution or creed? Have you used either to advantage in the realization of any of your ideals or purposes?
8. In what way have you applied the principle to the improvement of your own life and work? With what results?
9. How may the value of this principle be measured?
10. State briefly the results you obtained in solving Problem 1 of Experiment XII.
11. Discuss briefly the effect produced upon human conduct and behavior by a well-defined motto or slogan.
12. How may this psychological principle be used in increasing our personal efficiency in a given line?
13. Do the results obtained in Problem 2 of Experiment XII demonstrate the practical value of a motto or creed?

REFERENCE

EMERSON, HARRINGTON. Twelve Principles of Efficiency, chap. xiii. The Engineering Magazine Company, New York, 1917.

CHAPTER XIV

DISPATCHING OR WORKING YOUR SCHEDULE OR PLAN

After such detailed plans are made as were described in Chapter XII, and definite instructions prepared for carrying them out, all that needs to be done is to execute these plans according to the written instructions prepared.

1. IMPORTANCE OF DISPATCHING YOUR SCHEDULES OR PLANS

In all study and work the important thing is to get things done. Effective planning helps us to do more and better work, as already shown, but not unless the three most vital steps in effective planning are taken; namely, (1) looking ahead to ascertain exactly what has to be done, determining how much time should be allotted to each task and what materials and equipment are needed for doing these necessary things; (2) making out a definite schedule or detailed plan for doing all these things and assigning a definite time for the performance of each task; and (3) carrying out this plan exactly as made. It is not enough to establish standards for your routine tasks or to look ahead and make a definite workable plan, showing exactly what must be done, when, how, and by whom. These are mere preliminary steps that make the final performance of your tasks possible. All comes to naught if the last step in the process is not taken.

The essential thing for any student or worker to learn is therefore that he must actually *work his plans* to get any benefit from the schedules which he has made to help him in his work. There is no object whatever in making a plan unless it is used and helps one in doing the things he wants to do.

2. EXAMPLES OF EFFICIENT DISPATCHING IN THE BUSINESS WORLD

The best examples of efficient dispatching are to be found in the modern business and educational world. The slogan for the employees on the Pennsylvania Railroad is "The Pennsylvania is never late." This means that everything that must be done to equip these trains and to keep the equipment in perfect condition and repair, to make each worker efficient, and to get him on the job on time has been done. It also means that every plan that is made to equip and operate all these trains is carried out to the letter; otherwise they could not possibly be run on schedule time. It is to aid in and to make possible this *final performance* that all schedules and plans are made. All comes to naught unless these schedules are actually carried out, or (as the railroad men express it) dispatched.

A few years ago the minister of education in France could look at his watch and tell for any hour in the day what every teacher in France was doing at that particular moment. This was possible because all the work done in the schools was so perfectly planned and these plans were so uniformly carried out that anyone who knew the course of study and the organization of the schools could tell by referring to his schedule exactly what every teacher in a particular grade was doing at that hour of the day in the whole of France.

A still more remarkable example of dispatching is seen in the way the fighting was done on the battle front during the World War. Each soldier and officer was provided with a watch. In case of a charge on the enemy line an order would be given to move forward at some definite time, say three minutes after six, and to move only a certain number of yards, then stop and wait twenty minutes, after which another forward movement was to be made for another specified distance. If these orders had not been carried out to the minute and

according to the plan made by the commanding officer in charge, the army would have been shot to pieces by its own artillery, which made, in this way, a protective screen for the infantry that was charging the enemy line. And not only did this dispatching of the commanding officer's plans hold for one section of the line, it governed the responses of a million or more men who in this manner were controlled by definitely formulated plans which had, of course, to be carried out to the letter by every man who took part in the campaign.

The principle operates just as effectively in private life and in our personal work. We plan our work to facilitate its performance, but the whole plan fails if it is not dispatched exactly as made. Most persons waste more time and energy getting started at their tasks than they use in their performance. Effective planning will save both this time and energy, provided the worker has formed the habit of carrying out each item of his plan promptly and on time. Without the *plan* no effective dispatching could be done. Without the habit of doing *promptly* and *on time* all the things one has planned to do his plans would be of little service to him. Every student and worker should, therefore, establish the habit of beginning promptly each task to be performed, and of working intensively while he works, so that each task may be completed in the time that has been set for its performance and consume no more time than is actually needed.

3. ADVANTAGES OF EFFECTIVE DISPATCHING

The advantages of doing promptly the things one has planned to do are, perhaps, apparent to all. In the business world a factory or firm that could not fill or ship its orders when the goods are promised would fail in a very short time. The same thing holds in our personal life. If we do not plan our work accurately and in detail, training ourselves to carry out our schedules or plans exactly as we made them, we

become, when we try to bring things to pass, like those busy bodies in the world who are busy all the time but get nothing done, because they have not formed the habit of turning promptly from one of the things to be done to the next when the first is finished. Or we may be like the proverbial business man who regularly lost half an hour in the morning, then spent the rest of the day in trying to catch up.

Promptness in dispatching or the habit of making prompt and irrevocable decisions while doing the things one has planned to do not only makes one successful in his daily work but enables him to seize the many opportunities which arise in his life. If a worker has established the habit of investigating everything he does and has acquired the habit of using a scientific point of view, he is able to observe the opportunities which lie in his path and is better able to judge of their relative value for attaining his life's purposes and desires. If in addition he has formed the habit of *acting promptly* and *positively* in carrying out all his plans, he is able to *lay hold* of these opportunities when they are presented. The person who has not learned how to plan, or who fails to act promptly upon his decisions, invariably fails to act when such opportunities arise.

No other single factor, therefore, has so much to do with success in one's work as successful dispatching. It is the only cure for procrastination or for a defective and diseased will which prevents one from making a prompt and lasting decision when dealing with the things that come up in his ordinary life and work. Unless the habit of efficient dispatching is definitely established, most of one's vitality and time will be consumed by indecisions or by worrying about his work *before* he really gets at it. Many students fail in their work because they spend most of their time and energy in thinking how hard it is, or how they hate it, or in trying to decide which thing should be done first. Instead of starting their work promptly when the time comes to do it, they put it off hour

after hour, dreading it and worrying about it until most of their energy and time has been consumed.

Such procrastination may be carried on to the point where one is worn out completely, as happened in the case of the boy described in a previous chapter, who experienced a complete nervous breakdown because he put off bringing one pitcher of water each day from a neighboring spring for his mother. Instead of getting at it promptly when the time came, he put it off hour after hour, dreading it and worrying about it until he gave out completely. This is only an exaggerated case of what happens to every student or worker who fails to plan his work, or who has failed to form the additional habit of doing promptly and on time all the things which he has planned to do. It is not what he *does* that hurts him or wears him out. It is the indecision and worrying which he does *about* it *before* he starts that eats up his vitality and time. The only remedy for this situation is to make better plans for your work and to develop the additional habit of doing promptly everything you have planned, and doing it exactly as it was planned.

4. HOW THE HABIT OF EFFECTIVE DISPATCHING MAY BE ACQUIRED

As already indicated, the ability to act promptly and positively in the execution of your plans is a matter of acquiring certain habits which enable you to respond in this way toward your tasks. To learn to work one's plans, one must not only learn to start promptly everything one does but to *finish* everything begun and to learn to do it in the time that has been allotted in his schedule for the performance of this particular task.

The matter of taking up your tasks one at a time and applying your energies to them until they are completed is, in one sense, a sheer matter of will. Training in dispatching,

therefore, becomes a matter of training the will. But the surest way of weakening the will, as was shown in Chapter VII, is to select tasks that are too difficult for you to perform, while the very best way of *strengthening* the will is to finish everything that you begin. In other words, the will is made strong by developing the habit of succeeding with every task that you undertake. It is weakened by failures of every sort. This being true, the best aid for strengthening the will is better planning of your tasks, and arranging your work so that you *can succeed*, then seeing that these plans are promptly carried out.

5. AIDS TO SUCCESSFUL DISPATCHING

In addition to the suggestions for cultivating and strengthening the will, already presented in Chapters VII and VIII (which might well be reviewed at this point), a number of things may be done by a student or worker in establishing the habit of taking up each task promptly and finishing it when once begun.

The first thing to remember is that such a habit cannot be formed in a day or merely by desiring to do so. As was pointed out in Chapter IX, such a habit must be practiced without exception for a long period of time before it will be thoroughly ingrained in your life. The best way of establishing such a habit would, therefore, be to start with *one* particular task, like planning to get to school each day on time for the rest of the year, getting up promptly in the morning as soon as you awaken, planning to study a *certain* subject at a definite time of day and for a given period of time, etc. You should then drill yourself thoroughly on this *one task* until you can dispatch it easily and without exception exactly as you planned it. After this has been done, *never before*, you may take up *another* task in a similar way, practicing it until you have *established* the habit of doing this second thing just as you planned it. In the course of time your whole life and

work will be ordered in accordance with this principle, and you will save much time and energy.

Many devices have been used as an aid in establishing this habit. One device often used by business and professional men is the desk pad or calendar. In the morning when the worker is rested and at his best he makes his plans for the day by writing down on the blank sheet of the pad for that day all the things which he desires to do on that day. This serves as a constant reminder of the things to be done — calls, tasks to be performed, special letters to be written, etc. These things are usually listed in the order in which they are to be done, and as each item is completed it is marked off the pad. In this way all the important things are listed, so that none will be forgotten. They are written down, so that they will not have to be carried in mind. They are arranged in the best possible order to save time and energy in their performance. By crossing them off as they are finished one can see at any time, by glancing at the pad, just how much of his work for that day has been completed and how much still remains to be done.

Another plan that has been found still more effective is the use of a specially designed *dispatch card* or schedule blank for one's *personal* work, and the card-file plan for dispatching the work of others. On the cards for the file the head of a department writes down all the things that are to be done during the time for which the plan is made, and also when and by whom each thing is to be done. Where such planning is done, the work of a department or school may be efficiently carried on when the manager is not present.

Many persons can work successfully if they do not have to plan their work, because they may be efficient in dispatching and yet lack the ability to make an efficient or workable plan. Other individuals are efficient in *planning* and so make good executives or managers for large business corporations. A business executive must plan very carefully what he wants

done, and also select the persons who are to carry out each division of the work he has planned. Unless this be done he will not be able to unload any of his duties on others and it would be more or less fatal to the business if he became ill or dropped out. But since the work is all carefully planned and the plans written out, there is little for the manager to do except to plan the work for succeeding days and to select men and women who can successfully carry out his ideas and plans. If he should drop out of the concern, another man could easily step into his place and with the aid of the former manager's written plans soon conduct the business of the department without any loss to the firm.

A student or worker when performing his own *personal* tasks must be able to do both these things; that is, make an effective plan for his work and then execute his plans promptly and efficiently. For this no better aid has been found than to develop for that work a regular dispatching card or schedule blank which not only shows what has been planned for each day and week but which also enables the worker to keep an accurate record of how well he is succeeding in performing each item of his plan.

The chief value of such a schedule card lies in the fact that it will remind you from hour to hour of the exact things you had planned to do at that particular time, thereby aiding you in the execution of your plan. It also enables you to measure at any particular time your efficiency in the execution of your plans. With the aid of such a schedule card as we are showing in Form VII, on page 278, you will be able to measure in quantitative terms how efficient you are in dispatching your plans. Such measurement is one of the strongest possible aids for establishing the habits that will enable you to carry out all your plans in a successful manner. But in making your schedule and in learning to carry it out you should remember that the best way to form this habit is to practice on one thing at a time.

6. MEASURING YOUR EFFICIENCY IN DISPATCHING AND THE IMPROVEMENT MADE IN LEARNING TO PLAN YOUR WORK

By obtaining the data called for on Form VII, Experiment XIII, any student or worker may obtain an exact measure of his efficiency in working his plans for any particular day. If his plans cannot be carried out exactly as made, it will be proof either that the plan is defective or that he is deficient in his ability to execute his plans, or both.

To determine how efficient you are in doing the specific things you have planned for the day or week, divide the number of items you have planned to do during this period of time by the actual number of things which you have completed as you planned them. For example, if you planned to get to school on time that day and also to prepare for *four* regular recitations the next day, and completed only four of these five things as you planned them, your efficiency in the execution of your plan for that day would be only 80 per cent.

There is, however, another measure that should be made of your ability to plan and to dispatch your work as you planned it. This measure pertains to the *use* you make of your time in carrying out your plans. It is important for each worker to determine as soon as he can, by controlled observation or experiment, how long it should take him to complete each of his routine tasks. In the schedule for your plan and on your dispatch card you should record the time you are to begin each task, and when it should be finished or the next one begun. Or you may find it more profitable merely to indicate on your card when each task should be begun.

Where this more accurate type of planning can be done, the percentage of efficiency in dispatching may be determined more accurately still by dividing the standard time you allowed to complete all the tasks you definitely planned for by the time you actually spent in doing these particular things. If, for example, you planned to prepare all your class assignments

on a certain day in five and a half hours, which by previous experimentation you found to be sufficient time to do this work, and find that you have actually consumed seven and a quarter hours in doing these things that day, because of a lack of concentration, interruptions, daydreaming, etc., your real efficiency in *carrying out* your plan for the day would be only 76 per cent, which represents your degree of efficiency in *using* your time as you planned it.

One of the most keen and enduring joys of life comes from the completion of things that are distinctly worth while. If to this be added the knowledge that these things are being done right and on time, this feeling of satisfaction is increased so that the worker gets new strength and courage for doing other things.

7. SPECIAL EXERCISES IN LEARNING TO WORK ACCORDING TO A DEFINITELY FORMULATED PLAN

All students and workers have had some practice in working according to a plan, and hence some practice in dispatching their plans. But some people are so inefficient in dispatching that they are always late. They are not even able to get to the station on time when they wish to catch a train, or they are so inefficient in their planning and dispatching that they are half an hour ahead of time, which they always waste.

To learn how to carry out your plans promptly is in reality a matter of forming certain habits, as has already been pointed out. These habits cannot be formed by mere wishing or by sheer strength of will. They must be formed like any other habit that an individual acquires: (1) by doing the actual thing you want to learn to do, in this case performing *all* your tasks promptly and on time; (2) by repeating the performance many times, attaching as much satisfaction to the execution of the task as you can and as much displeasure as possible to

the responses you wish to eliminate or avoid. One thing must be remembered; namely, that these desirable habits cannot be acquired in any wholesale way. They must be established *one at a time*, and no serious exceptions must be allowed to occur in making the desired responses until the habit which you wish to fix has been firmly established. It is better, therefore, in learning to plan, to attempt to schedule and standardize only *one* thing at a time, and to see that this thing is regularly done exactly as planned and that it is repeated until the desired habit is firmly rooted in one's life.

EXPERIMENT XIII

Exercise 1. In establishing the habit of promptly dispatching each item of your work as you planned it you should begin with the things which you have already learned to do rather promptly, and perfect your habits of will by dispatching these. The very first thing that a student should plan to *do and do each day exactly as he planned* it is to *finish all the work* that has been assigned him for the next day. These *daily* assignments should be most carefully planned for each day and done exactly as assigned. Any student who will definitely plan to do this much work each day without *any exceptions* and who will arrange to *execute these plans each day* will not need to fear the results of his examinations at the end of the semester, or failure at the end of the term. What is still better, he is acquiring the ability to work his plans and forming a habit that will contribute to his personal success in everything he undertakes.

Exercise 2. A second exercise that would give any student or worker direct practice in dispatching his plans as well as value received for his efforts is to plan to keep up each day with his reading of the general news and the most important discoveries made in the occupation for which he is preparing or in the science in which he is especially interested. A definite time might be set aside for this reading, and this feature of one's plan be carefully and regularly dispatched. If this were done one would be learning how to work in the most effective way while obtaining valuable information from his reading.

Exercise 3. Other means of getting helpful practice in dispatching are (1) to plan to make all your calls *when* they should be made; (2) to make it a point to acknowledge invitations promptly; (3) to express your thanks and appreciation promptly for any gifts or favors which you may receive; (4) to make it a point to congratulate your acquaintances and friends when they have won marked and merited success; (5) to extend your good wishes promptly to those who would be encouraged and helped by such thoughtful kindness; (6) to let your representatives in the legislature know how you think and feel about the important matters that are there being discussed and dealt with by them.

Making it a point to attend to such important matters *each day* or *week* would not only develop the habits involved in successful planning but would develop other habits that are important for attaining the highest success in life.

Exercise 4. Not the least important thing which every college student should do is to write a letter home regularly each day or week and to plan to keep up all other important correspondence as promptly as he goes to his classes or meals. This will not only save time and win friends but develop orderly habits and result in a feeling of satisfaction that will help him greatly in doing *other* important things, to say nothing about the gains he will be making in learning to do all necessary and important things promptly and on time.

EXERCISES AND QUESTIONS ON THE TEXT

1. Illustrate the principle of dispatching, pointing out its relation to planning and its general importance.

2. Give at least three prominent examples of the use of this principle in the modern business world.

3. Point out the advantages of acquiring the habit of executing all your plans promptly and just as you made them.

4. How may the habit of "working your plans" best be acquired? (Compare section 4.)

5. In what ways is the habit of executing your plans promptly related to the training of the will?

6. What is meant by a "dispatching" or "schedule" card? How may it be used to advantage in establishing the habit of promptly executing

all your purposes and plans? How may it be used in directing the activities and work of others?

7. Explain how the progress made in learning to dispatch or to "work" your plans may be measured in any particular case.

8. How may you tell when this habit has been well enough established to let you give your attention to the formation of other sets of habits which will increase your personal efficiency in other directions?

9. Name and briefly explain five ways in which this habit of dispatching may be definitely exercised.

REFERENCES

EMERSON, HARRINGTON. Twelve Principles of Efficiency, chap. ix. Engineering Magazine Company, New York, 1917.

STRATTON, G. M. Developing Mental Power, especially pp. 29-72. Houghton Mifflin Company, Boston, 1922.

CHAPTER XV

MAKING CONDITIONS FAVORABLE FOR THE MOST EFFECTIVE WORK

1. ILLUSTRATION OF THE PRINCIPLE OF STANDARDIZING THE CONDITIONS FOR WORK

The most effective work cannot be done unless the conditions under which one labors are made as favorable as possible for the work to be done. It has, for example, been shown by accurate measurement that children in school will do about 40 per cent more work, or will do their work this much better, if the conditions regarding light and temperature are made favorable. It has also been shown that the color of the walls of a schoolroom has a marked effect on the attitude and reactions of the pupils. The grounds and general environment of the hospitals for the insane and for patients with nervous diseases are purposely made beautiful, and suggestive of quiet and peace. And all progressive business firms are today paying special attention to making the conditions under which their employees work as favorable as possible. Many, realizing that their employees have a more healthful attitude toward the firm and will do more and better work if these conditions are made favorable, are beautifying their grounds, putting in rest rooms, a cafeteria, and even extending these services to the homes and neighborhood of their workers. Moreover, everyone is aware how much clean linen and attractive surroundings have to do with the digestion of one's food. Making these conditions favorable and attractive even affected directly and in a measurable degree the courage and general responses of our soldiers in the late World War. So

important, in fact, is the influence of these surrounding stimuli that efficiency engineers regard the standardization of these working conditions as one of the most important principles that determine human efficiency in every kind of productive work.

This principle, making the conditions under which we must live and work as favorable as possible for human efficiency and health, applies to every activity in human life, from awakening, rising, bathing, shaving, and dressing in the morning to every task that one has to perform during the day, down to the last thing we do, namely, going to sleep at night. The conditions for many of these routine tasks may be standardized, and where this is done the speed and accuracy of the worker's performance will be greatly increased and the amount of effort required to do a given bit of work will be correspondingly decreased, while the worker saves much time and energy for other tasks.

2. EXAMPLES OF STANDARDIZED AND UNSTANDARDIZED CONDITIONS OF WORK

Harrington Emerson gives the following example of the effect of unstandardized conditions for work upon the performance of a very simple task and points out its effect upon the individual's responses when he takes up his regular work later on in the day. He says :

Suppose, for example, that you awaken in the morning half an hour late. You are dull and dispirited and are compelled to struggle with yourself before you can rise. You find that you must hunt the plug of the bath tub before you can bathe. You have also failed to provide fresh towels and are again delayed, wet and chilly, while they are brought to you. Your shaving soap is likewise exhausted and you are finally reduced to using ordinary soap. You have mislaid your shaving brush, which causes still further annoyance. Your razor, too, is dull because you forgot to have it honed, and it

takes you three times as long as usual to strop it into even usable keenness. When you are ready to dress you have trouble in locating clean hose. You find that the only clean suit of underwear you have on hand needs several buttons. The process of putting away and taking care of your clothing is unstandardized so that you have trouble to find your clean shirt which has been put into the wrong drawer. Your annoyance and delay is further increased because you have failed to provide yourself with collars and you are obliged to wear one that is frayed at the edge. Your ties are likewise in a jumble, and you tumble them about before you find the one you want to wear.

All this not only requires attention, but so reacts upon your mental condition that you reach the breakfast table cross and irritable. You do not enjoy your food as you should, which reacts upon your digestion and hence unfavorably upon your attitude and efficiency for the day.

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If all these *external* conditions had been standardized, so that the process of awakening, bathing, shaving, and dressing could be carried on with practically no conscious attention, your mind, refreshed by a good night's sleep, would attack and plan a big day's work with delighted eagerness and effectiveness while these automatic and standardized performances were going on. You would thus reach the breakfast table exactly on time, in a cheerful and happy frame of mind, and with a keen, healthy appetite which not only gives the highest possible pleasure but insures digestion, a favorable mental attitude, and a state of efficiency for beginning the day's work.

If you can begin your day's work in such a manner, and will standardize in the same way the conditions for your other activities, you will find yourself mentally fit to devise not only better, easier, and quicker ways of accomplishing your tasks but higher, more enjoyable, and more profitable forms of work.

The same thing holds for students in beginning their day's work. The writer has seen scores of college students who, because no attention was given to this point, rush to their first recitation in the morning, arriving two or three minutes

late after missing their breakfast, or, what is worse, after eating it in five or ten minutes, which means that they bolted their food and thus not only lowered their efficiency for that day, but injured their digestion and health. Such a practice, if continued, has a far-reaching effect on one's personal efficiency and usefulness in life.

3. KINDS OF CONDITIONS THAT MAY BE STANDARDIZED

There are three sets of conditions that should be made favorable for study or other work. One should secure favorable objective or external conditions for his work ; one should make and keep himself physically fit for it ; one should improve certain subjective or psychological conditions which materially affect the quality and quantity of the work a student or worker will be able to do. The first two sets of conditions will be described in this chapter ; the influence of the worker's mental attitude toward his work and toward his success will be discussed in Chapter XVI.

(1) *Keeping Yourself Physically and Mentally Fit for your Work*

Nothing is more important than to keep yourself mentally and physically efficient by developing proper habits of relaxation, of sleep, of eating, and by planning to take the right kind and amount of exercise to keep your organism in the best of condition for doing the things that you wish to do. Fatigue, ill health, and the sensations which normally arise when this set of conditions is not made favorable serve as a constant and almost irresistible source of distraction which not only interferes with the effectiveness of your responses but consumes as much energy as the work you do, if not more.

It has been determined by careful experiment, for example, that a very slight variation in one's health has a marked effect on his efficiency in study or in other work. Many students go

through college and succeed with their academic work only to find, when they get through, that they must be *educated* in a hospital, because they have neglected the most fundamental element in a successful life. The effect of one's general physical condition is so important that special attention is being given today to the matter of health by all employment managers in business and industry and by all superintendents and boards of education, because they realize that it affects directly the character of the work that can and will be done by the persons they employ or supervise.

No one, probably, is ever 100 per cent efficient in regard to his mental and physical health. All could, therefore, improve their efficiency along this line, to say nothing of avoiding the things that injure their efficiency and health permanently. No subject is in fact more important for personal efficiency than to learn to cultivate habits of life and work that will improve one's general physical condition or mental and bodily health.

As a practical exercise in making this set of conditions more favorable try the following experiment and record carefully the results which you obtain.

When you have worked steadily for several hours and you begin to feel cramped, mentally sluggish, and fatigued, with perhaps a slight pain in your back or neck, *get up and walk about the room*, stretch yourself, go to the window and throw it wide open, breathe deeply clear down to the bottom of your lungs five or ten times. Then sit down in a comfortable chair or, if possible, lie down on a couch and completely relax the tension of *every* muscle in your body for three or five minutes. When you go back to your work, note and record the effect which this device has produced on your ability to work.

Such a return to fresh air and exercise will help to make up for the artificial conditions under which you are working and should greatly improve your effectiveness in whatever work you undertake.

(2) *Need for Standardizing the External Conditions under which we must Live and Work*

Man's body and all his organs have by the past experiences of the race been adapted to a very different kind of life from that under which we are compelled to live in modern civilized life. By unnumbered centuries of heredity and outdoor experience man's organs and body have been fashioned for an active, untrammelled outdoor life.

Modern residences, offices, schools, and factories with their confined air, artificial light, and artificial heat represent new and difficult conditions for the human organism. Modern clothing, excluding light and air from the body and restricting its movements, introduces further complications. Man's present-day occupations, holding the body quiet for hours at a time, constitute still another comparatively new and unnatural condition.

We cannot of course go back to the free, open-air life of our ancestors under the trees and upon the plains, but must adapt ourselves as best we can to the unnatural surroundings which civilization has thrown about us, and make these conditions as favorable as we can for the work we have to do. Or where these conditions can be changed, we should try to make them *more favorable* for realizing our highest purposes and aims.

But not only are the conditions under which we are compelled to live and work more or less unnatural for the healthful activity of our organs and body, all the stimuli coming from our working environment are in constant competition with the stimuli which operate to elicit the responses we are required to make in doing our work. These competing stimuli which condition the actual responses that a student or worker will make should, therefore, be made as favorable as possible. And it is well to remember that they can be made really *helpful* for the work to be done if only we know how.

Everyone knows that quiet or the absence of much stimu-

lation, together with the bodily sensations which come from a soft and comfortable bed, are favorable for inducing sleep; that a *hard straight* chair is a favorable supplementary stimulus for concentrated attention and for complete and continued application to the work in hand, while a reclining position, such as is induced by sitting in a rocker, and the actual swaying of the body while rocking, naturally cause the mind and attention to relax and so constitute an unfavorable condition for the best type of mental work.

By the continued presence of such supplementary stimuli one is not only made more indifferent to them; if they remain unchanged, they come in time to facilitate the effect that is being produced by the *regular* stimuli that elicit the reactions we must make in doing our work. This facilitating effect may be illustrated by the following stories taken from the letters and autobiographies of two very efficient and noted men.

The great philosopher Kant had formed the habit of looking at a certain weather vane on his neighbor's barn which stood near his study window. Year after year this served as one of the regular conditioning stimuli in his surroundings while he worked out his most difficult problems and did his most abstract thinking. One day his neighbor took down the vane to repair his barn, which so interfered with the professor's thoughts that he made bitter complaints to the city magistrate, stating that he no longer could successfully do his work.

A similar story is told of Sir Walter Scott, who could not pass to the head of his class in spelling because his rival in school stood at the head of the class and could spell every word. One day Scott noticed that his rival always fingered a certain button on his coat while he spelled the more difficult words. Day after day Scott noticed his classmate fumbling this button when he had difficulty in spelling a word. One day Scott decided to clip off this button without letting his classmate know what he had done. The next day when this champion speller was required to spell a difficult word he

reached for the button and was so confused and disturbed by the absence of this extra and helpful stimulus that he missed the word, which Scott promptly spelled and passed to the head of the class.

In like manner almost any stimulus or group of stimuli may be made in time to facilitate the performance of any bit of work, as is done when a student forms a *time* and *place* habit of study, or when a speaker plays with his watch chain or a pencil while delivering his lecture. Such conditioning stimuli come in time to reinforce the effect that is being produced by the regular stimulus required to elicit the necessary response. In case of learning, such conditioning stimuli even help in *originating* the new and more economical methods of work that must be invented in the process of learning, as the writer has elsewhere pointed out.¹

4. HOW TO MAKE EXTERNAL CONDITIONS FAVORABLE FOR THE MOST EFFECTIVE WORK

(1) *Forming a Time and Place Habit for Study or Work*

For reasons already given each student and worker should make it a point to form a definite time and place habit for work. This means that when a certain time of day rolls around he will be in this place ready to apply himself promptly and fully to his work. When such a habit has been formed, all the surrounding stimuli will soon come to suggest or even help to elicit the particular responses which the student desires to make, such as complete concentration upon his work or continued application to his tasks until they are finished or as long as he remains in that particular place. Such a habit may become so strong that it makes every phase of the work done at that time and place easier to do because of the facilitating effect of these extra conditioning stimuli that under

¹ W. F. Book, *Learning to Typewrite*, chap. v, especially pp. 114-117. The Gregg Publishing Company, New York, 1925.

other circumstances would serve as a source of distraction. But to form such a habit a student must never permit himself to do anything except his regular work when in this particular place. No loafing or general reading must be done in the chair or place dedicated to study. When such a habit has become firmly fixed, one needs only to take his place to arouse the proper mental attitude required to start the flow of his associations and mental energy in the right direction.

The same is true if you have a definite *time* for doing your work. By having a regular schedule for your tasks you are not likely to get behind in your work. You also begin more promptly when it is time to start, and for reasons that have already been given it is easier to concentrate fully on your work. When such a habit has been formed, the very act of taking your place for work, sitting up straight, and opening your book starts you off promptly and helps to keep you effectively applied to your tasks because of the facilitating effect which these extra conditioning stimuli have come to exert upon your reactions.

The law also applies to the organism as a whole, which may adapt itself in a physiological way to such time and place habits. This is done in cases of severe illness where the nurse adjusts the organism of her patient to taking food and sleep at certain specified periods of the day by the way she controls these extra conditioning stimuli.

Every student should, therefore, form a time and place habit for his study and for doing certain phases of his work because this simple device will greatly increase his ability to work.

(2) *Securing a Quiet or Favorable Place in which to Work*

Other conditions that should receive special attention are the kind and amount of light that are present while you work, the temperature of the room, the humidity of the air, and the

distracting stimuli of every sort that affect you while you work. The latter not only consume your energy, as has already been pointed out, but by the action of the normal laws of sensation and attention they divert your mind and energies into other channels than those that lead directly to the results which you desire to achieve.

Most business concerns realize the injurious effects of distracting stimuli and have located their offices in the most quiet place in the building. In a department store they are usually located on the top floor above the noise of the store and the street. Further to eliminate distracting stimuli, such firms use noiseless typewriters and in other ways try to reduce to a minimum the drafts made on the energy of their workers.

In schoolrooms and in apartment houses special paper or deadening-felt is used to eliminate as far as possible the noises from the other rooms and apartments. Less attention is, however, given to the problem of lighting, to keeping the temperature uniform and what it ought to be, to seeing that there is a proper exchange of air in our working quarters.

It is very important, therefore, for a student to arrange for a place to work that is reasonably free from interruptions and distracting conversations. Study demands active attention. In order to give your entire thought and mind to your work no other matters must be allowed to intrude. Everything that happens in the room where you are working makes a claim on your attention. If there are noises or other distracting stimuli, a part of your energy must be exerted to keep your attention and mind focused on your work. It is clear, therefore, that if you can work in a room where these outside appeals are lacking or reduced to a minimum, you will have just that much more energy to devote to your work.

It is of course a good thing to train yourself to overcome such distractions so that you will be more or less independent of your surroundings, but there will always be enough distracting stimuli in your life and connected with your work to develop

this necessary habit without making things unnecessarily hard for winning success. Some persons can work under very distracting conditions, but they are the exception. And it should be remembered that work done under unfavorable circumstances takes more energy to perform than when the causes of these distractions are removed.

It would therefore be well to reduce to a minimum all distracting stimuli. Professor Starch gives a practical illustration of the value of this point in his account of the procedure of a certain life-insurance agent who was unusually successful in selling his policies. He writes :

This agent adopted the plan of selling to no one except by special appointment in his own office from which all possible distractions had been removed. There was nothing on the walls and nothing in the room but a desk, a telephone, and a couple of chairs. There was nothing on the desk except a life insurance policy, which was placed there at a certain time in the interview. The purpose was to secure conditions under which there were absolutely no distractions whatever, so that the only thing to think about would be the purchase of the policy. For a time there was a calendar of the company hanging above the desk, but this agent found that many clients would remark, upon leaving the office, about the interesting dates designated on the calendar. There was nothing else to distract their attention and consequently these stood out in the minds of the clients and, therefore, appeared interesting. He then removed the calendar to a rear wall so that even the dates might not distract.¹

All these features were a part of a carefully prepared sales plan of a man who was one of the most successful life-insurance salesmen among all the agents of that company. In a certain month he had the record of selling the largest number of policies of all the salesmen of this large company — a record that was achieved after only eighteen months of experience in selling insurance. It would, of course, be absurd to attribute

¹ Daniel Starch, *Educational Psychology*. The Macmillan Company, New York, 1919.

his remarkable success to this one element, but it was nevertheless a very important part of a carefully prepared plan of salesmanship.

Most students also forget how much *extra* energy is consumed if they let a light shine in their eyes or work while facing a window or a brightly lighted wall. By arranging the position of your book and paper so that the light comes from above and, for all desk work, from a point in front of and to the left of your body you avoid all shadows which interfere with the economical perception of the materials you are reading or working with. The most favorable illumination for desk work at night may be secured from a single electric light placed under an opaque reflector so adjusted as to flood the desk with light without illuminating the rest of the room, thereby saving much energy and favoring the concentration of attention upon your work.

(3) *A Practical Suggestion for Making Helpful Adaptations in the Use of your Eyes*

Through countless generations of heredity and use our eyes were developed to look upon trees, mountains, and large bodies of water. They were formed and developed to discern the deer moving on the distant hills, to perceive the wild animal while a long way off, to gaze upon the clouds and the stars. We now use them hour after hour in tracing tiny black marks upon slick white paper placed some twelve or fourteen inches from our nose. This is highly artificial and unnatural work for our eyes, and unless they are unusually strong and very well formed and protected they soon begin to fail and place a severe strain upon the whole nervous system, a strain that cannot be directly perceived. This strain causes, in time, headache, nervousness, and if long continued a complete breakdown of the nervous system.

A practical suggestion for improving these *artificial* condi-

tions for your eyes would therefore be to drop your work occasionally and go to a window and look far off over the roofs and if possible let your eyes feast upon distant hills, upon a forest, or upon the stars. You should not wait until your eyes hurt or are almost worn out. You should study your needs in this respect and rest your eyes at certain intervals and for a long enough time to enable them again to accomplish their usual tasks with no feeling of weariness and no extra wear on the nervous system.

(4) *Standardizing your Materials and Equipment*

A worker should also see that the materials he needs for his work, and all necessary equipment, are at hand and are such as will facilitate his work. They should be such as will favor continuous and complete application to his tasks. The worst kind of habit that a student can form is one of working in a listless or half-hearted sort of way, thinking that he can make up for this more inefficient type of application by working more hours. Such a worker develops habits of mental laziness which will, if established, prevent him from making the most of his opportunities and abilities in life. Special attention should therefore be given to making the materials we need and the tools we use as favorable as possible. We have already pointed out why it is better to use a straight, hard chair when one wishes to do the best type of mental work. Much time is lost because students do not plan to get everything ready for effective and continuous work before they begin.

The study table and chair should be of a height to fit your needs. If the table is too low, you have a condition which encourages a contracted chest and a congested brain because your breathing is inefficient and therefore fails to provide the oxygen needed by your working cells. If the table is too high, the discomfort produced interferes with the working of your mind and lowers your efficiency because of the distraction.

Taylor determined by careful experimentation that length of handle, size of shovel, rate of movement, and weight of load greatly affected the amount of work which his shovelers could do. He found that when these conditions were made most favorable his men not only did more work but did it easier than when their equipment was not thus standardized.

The same thing holds for the work of a student. He should *plan* to have all the "tools" and materials he needs for his work. These should be in good condition and so placed that they will be ready at hand when wanted, but out of the way when they are not being used. The proper amount of attention given to securing suitable materials and tools will save far more time and energy than anyone can realize who has never tried to measure the actual saving which it produces.

5. NORMAL EFFECTS OF THE WEATHER ON HUMAN EFFICIENCY

But some external conditions — the conditions regarding temperature, humidity, electrical tensions, wind, etc. — cannot be controlled and therefore made wholly favorable for work. Then one must plan to make the best possible adjustment that he can to these conditioning stimuli, because they are beyond his control and produce a far greater effect upon one's reactions than most people understand.

The fact that the weather influences our conduct or personal efficiency and lives is understood by all. The world has had its weather prophets as far back as we have any records. And the words of salutation of all peoples and races are shot through and through with allusions to the weather, such as "good morning," "good evening," "nice day," "good night," etc. There are also many weather myths in the mythology of all peoples who have developed a religion. It has also been pointed out that the most important history of the world has been made by the people who have lived in the temperate zone, and that the character and habits of any individual are

changed very materially when he is forced to live in a country where the climate is very different from that of the country in which he has lived, as happens when a northern-bred man moves to a country located in the torrid zone or when an Englishman is transported from the wet, foggy sections of eastern England to sunny Australia.

(1) *How the Weather Affects our Ability to Work*

The effect upon human efficiency of the stimuli coming from changes in temperature, barometric pressure, humidity, wind, etc. has been studied experimentally by many investigators. An investigation made by the Bank of England a number of years ago showed that most of their mistakes in calculation were made on the rainy and foggy days so prevalent in England. As a result they ordered their most important books closed on these days.

A manufacturing establishment in the East, employing three thousand men, kept an accurate record of their production for a period of years and discovered that their output was 10 per cent less on the cloudy and rainy days than on the bright days. They also found that there were more accidents on cloudy days than on a clear day. It has also been observed that on a wet and cloudy day the pupils in school misbehave more than on a good day, while it is a matter of common knowledge that gout and certain other diseases are worse in bad than in good weather.

The weather also affects the sense organs directly, as well as the nervous system as a whole. Some very sensitive people complain of a sort of "eye hunger" on a dark day. That is to say, their eyes do not seem to get enough light on the darker days; and tea tasters have been found to be less efficient on a cloudy day. It has also been found that those who test flour by the sense of touch are less accurate on a gloomy day than on a clear day.

The law which enables this group of subtle stimuli to have such marked and important effects upon human efficiency and conduct is well known to all psychologists and is called the law of "diffusion of stimuli." The law is that any stimulus that affects *one part* of the nervous system or organism tends to reverberate everywhere. This is well illustrated by the experiments made on the knee jerk, or reflex movement made by the right leg and foot when the patellar tendon of the right leg is tapped just below the knee-cap after this leg has been crossed over the knee of the left. It was found that the strength and character of this reflex response were influenced directly by every kind of stimulus that was applied to the subject simultaneously with the regular stimulus the direct effect of which was being measured. In like manner it has been found that the circulation of the blood, the character of one's breathing, and the ability to release one's energy in a "strength test" are modified directly by every stimulus that is injected into the environment of the subject upon whom the measurements are made. This explains why such elements of the weather as changes in temperature, humidity, barometric pressure, etc. affect directly the quality and quantity of work which one can do at any particular time.

The elements in the weather which affect an individual's ability to use his mental and physical powers are, as we have already suggested, (1) temperature, (2) humidity, (3) barometric pressure, (4) general character of the day, such as clear, cloudy, etc., (5) wind, and (6) electrical tensions. The most important of these six factors are, without doubt, temperature and humidity.

Temperature. It has been shown that all life on the earth exists within a range of temperature of 200° F. If we should take the total known range of temperature, starting with the temperature of the sun, $100,000^{\circ}$ F., and going down to absolute zero, 460° below our zero point, and if we should represent this total range on a linear scale, allowing 1 inch for a degree,

our scale would extend about $1\frac{1}{2}$ miles. On this basis the scale for living things would occupy only about 16 feet. McGee has shown that if there should be a sudden drop in temperature of 100° , all life would be swept from the earth.

That all protoplasm is highly sensitive to changes in temperature is shown by many experiments. Tadpoles placed in a trough heated at one end and cooled at the other will arrange themselves at the point giving them the nearest to the optimum temperature. If placed in water too hot or too cold, they soon stop breathing and die.

Man is superior to all other animals in his ability to resist such changes in temperature and in the power to adapt himself to this type of change in his environment. But he is nevertheless greatly influenced by this group of stimuli. Some of the effects which temperature produces on man may be easily seen by noting the difference in the present inhabitants of the torrid and temperate zones and by following the history of the peoples who have lived in these belts of the earth in the past. The most favorable area for human progress is that part of the temperate zone which has an average temperature of from 56° to 60° . In fact, the control of the world has always been in the hands of men who lived in this belt, and doubtless always will be.

The most favorable conditions of temperature for human efficiency would be obtained by keeping a study or workroom at a temperature of from 65° to 68° , with some special device for keeping the air properly filled with moisture. This latter point is very important, since the air in most rooms heated by steam or hot water is drier in the winter time than the air in the Desert of Sahara, a condition that greatly reduces human efficiency, as we shall presently show.

Humidity. High humidity is a favorable condition for the breeding of the germs that cause disease, especially when it is combined with excessive temperature. The effect of humidity upon the release of human energy is well illustrated by the

results of certain experiments on school children. These experiments have shown that children fatigue less and can do more and better work when the conditions of air with regard to temperature and humidity are favorable. Recent experiments have shown that it is not the poisons in the air which make children drowsy and tired in school but improper temperature and excessive humidity. These produce the feeling of fatigue and reduce the children's vitality and ability to learn.

Barometric pressure. It has also been shown that men living in moderately high altitudes are as a rule more vigorous and have better heart and lung capacity than men living near sea level. Jockeys often rear and train their race horses in Colorado or in some other place with a high altitude, for when brought to a lower altitude they have a tremendous advantage in lung and heart development over the horses that have been reared and trained in lower altitudes.

Emotional effects. While it is true that the weather affects our supply of energy and our ability to release and control it, the greatest effect produced is doubtless upon our emotional life. Still we do not always act as we feel. On a gloomy day we may have the disposition to do a mean act, but our supply of energy may be sufficiently reduced not to carry it out. On a bright, cheery day our supply of energy is increased, but we also have a cheerful mood with less inclination to wickedness. The two elements may, therefore, partly offset each other; but not entirely. It is very well known that most individuals are influenced tremendously by the weather. Some are affected more than others. The important thing is to make the best adaptations that you can to this group of stimuli over which you have only partial control.

Two types of improvement must be made by every successful worker and student: (1) to change and improve as far as possible the external, physiological, and psychological conditions that affect one's efficiency; (2) to make proper adaptations to all the conditions which he cannot control.

(2) Some Practical Adjustments to These Weather Influences

The depressing effects of the weather may in part be offset by artificial means such as a change in program, a change in dress, etc. Irsome things should be thrown aside on the worst days and your programs shifted to counteract these weather effects. Your planning and your most important work should be done on the bright days, in winter, and during the periods of the day when you are at your best mentally and physically. Routine things can be done at any time. It is also worth while to try to make up in your dress and in your general behavior for some of these subtler stimuli which materially affect your efficiency and conduct.

The writer knows, for example, a woman who makes it a point to dress in accordance with the weather and to be bright and cheery when her husband comes home tired from his work. A certain friend always makes it a point to go to church on a bad Sunday. He may miss on a good day, but never on a rainy day. Some ministers try to fit their sermons to the needs of their people at the different seasons of the year and on the gloomier days.

Since such marked changes in efficiency are produced by stimuli that are not directly under our control, workers should make such adjustments to them as will tend to keep their attitude as favorable as possible or as will enable them to utilize to the fullest possible extent a set of conditions over which they have no direct control.

6. CHECKING UP ON THE VALUE OF YOUR METHODS OF WORK AND ON THE VALUE OF YOUR PLANS

In explaining the adjustments that should be made to these subtle weather conditions over which one has no direct control we are reminded of an important phase of personal efficiency that has not yet been discussed ; namely, learning how

to select your tasks more wisely, deciding when you should adjust yourself to the conditions and present methods as they are, as must be done in case of the weather, and determining when you should seek to change or improve these conditions.

As has already been shown by the discussion which precedes, there are two ways in which greater efficiency may be obtained by control over the conditions under which one works: (1) We may standardize the conditions as they are, that is, make the best possible adaptation to the conditions as we find them. (2) We may change these conditions in certain important respects, making them more favorable for the tasks that have to be performed. Every student and worker should learn to do both. But in so doing he must decide when it is best to change his equipment and the conditions under which he is working and when he should make an adjustment to the conditions as they are. In the work of a student, for example, it is sometimes desirable to standardize conditions as they are. More often new methods may be found and a radical improvement made in equipment, in procedure, and in the working environment.

Most students and other workers spend many hours in doing things that are utterly useless or that are only mildly helpful. They may even work all the time and be fairly efficient in doing the things which they have planned to do. But they are woefully inefficient in the *selection* of their tasks. They fail, not because they do not use all their time and energy, not because they do not succeed in doing *well* the things they have planned; they fail, as we pointed out in Chapter VI, because they are doing inefficient and harmful things. In everything that a student or worker does the most important thing is the *selection* of his tasks. All fails if the right things are not worked at. Because so many of his tasks are planned for the worker and assigned to him by his manager or foreman, efficiency in the *selection* of one's tasks has been called by efficiency engineers efficiency of *assignment*.

The same thing is true for a student. Most of his work is planned *for him*, and he is often told by his teachers what to do. But each student should learn to plan his own work and his own procedure in the performance of his tasks. In so doing he must learn to judge what things should be done, as well as when and how they should be performed. If a student, for example, should buy books that are rarely or never used, he would be inefficient in the *selection* of his equipment. If he should select courses and plan to do work that does not call out his best talent and ability, he would be inefficient in the selection of his tasks and in the most fundamental element of planning. Still greater inefficiency would result if he did not select the work that was suited to his abilities and interests or if he really failed to plan for the things that must be done to attain his larger purposes in life.

Efficiency in the *selection of one's tasks* is very difficult to measure. The real value of each item must be judged in the light of the purpose or end to be attained. In making this estimate, the more definitely and constantly the worker keeps his goal in mind the better able will he be to determine a standard value for each item in his plan. The basis for your judgment is how many of the things you have planned to do help you to get where you want to go. Your efficiency in the *selection of your tasks* may, therefore, be determined by dividing this standard by the number of tasks you have planned.

Help for evaluating each thing which you do comes in the main from making a detailed and systematic study of your *tasks* and *work* as we recommended in Chapter XI. Much help also comes from keeping more definitely in mind your specific purpose or goal in each case. This will help you to determine the real value of what you have planned or are attempting to do. We wish, therefore, again to call attention to the importance of making a careful analysis of all your tasks and of your work taken as a whole, in order that you may find the

best ways of doing these necessary things and therefore be better able to judge whether all the items in your plan are really necessary or not, and also to determine their relative importance for realizing your true purposes in life.

7. MEASURING IMPROVEMENT IN LEARNING TO PREPARE AN ASSIGNMENT IN YOUR TEXT

To learn how to study effectively involves a number of things: (1) The learner must form right habits of mental work, as we are attempting to show throughout this book. (2) He must acquire the ability to recognize clearly and definitely the specific problems set before him and learn to devise and recognize accurately and quickly the means that must be used for their solution. (3) He must be able to decide what things should be learned verbatim, like learning to spell "receive," and when some other purpose or goal should direct his efforts.

There are, therefore, three different kinds of study or methods of procedure which a student may follow in doing his regular work :

1. He may be asked to do work that is planned and carried on mainly for the purpose of developing right habits of mental work. Much of the work which a student does consists of converting certain subject matter, presented in lectures or through reading, into ideas that are to be used in the subsequent life of the student. These ideas are supposed to be acquired in a way that will give exercise to all the capacities and powers which the student possesses. That is to say, the student should get his facts in a way that would develop efficient habits of work.

2. A second type of work which all students are required to do is to learn certain things verbatim ; that is, make these a permanent part of their fund of knowledge so that they may be readily recalled and used, like the multiplication table. This

is the case when we learn to spell a new word, learn important dates in history, memorize the more important laws and principles of a science or the meaning of words when we study a foreign language.

3. Most of the work of a student in high school or college consists, however, of making an investigation or critical survey of a particular topic or problem selected by himself or assigned by his teacher. In such a case the student must get all the available information bearing on that topic. His task becomes one of getting from a textbook or series of books what these authors have to say about this topic. As a rule he must seek information on this problem in many places. He must, therefore, learn to do this sort of thing in an efficient way and acquire the ability to judge accurately and quickly just what the author has contributed on that particular subject. These points must then be arranged in a logical sequence and learned in a way that will enable him to recall and use this information when it is needed.

But a student often reads an author or book merely to see whether he has anything to contribute on the topic upon which the student is working. In such a case he reads only the table of contents and a paragraph here and there. He may, however, be reading a chapter or book to ascertain *everything* that the author has to say on *all the topics* which he has discussed. In this case the student must learn almost verbatim certain parts of what he reads. The important thing in every case is the *aim* of his study. This should be definitely known and clearly kept in mind while he works, in order that the most effective results may be obtained and right habits of work acquired as a result of the application and work.

The purpose of the next experiment is to measure your efficiency in mastering a given assignment when the object is to ascertain *all* that the author has said on the various topics which he discusses. In an earlier experiment (Experiment VIII) you were asked to ascertain your ability to per-

form such a task when your own natural method of study was used. In the present experiment you are asked to determine your ability to perform this task when the *most effective* method of study is employed. By comparing the results obtained in the present experiment with the results obtained when following *your own natural* method of work, you may determine the amount of saving in time and energy, if any, by employing the most economical procedure in doing this type of work.

EXPERIMENT XIV

Problem. To determine the saving in time and energy when the most effective method of mastering an assignment in a text is used.

Method. Read the next chapter in this text or some other similar assignment rapidly and as a whole. Begin by referring to the analysis of the points treated in the chapter as listed in the table of contents or in the sectional and paragraph headings. Before you begin to read or to analyze the contents of the chapter, note carefully *what the chapter is about* and ascertain *from the outline* of the chapter in the table of contents all the *important ideas* or points which it treats. As you read jot down on a piece of paper or on the margin of the text, in very brief form, the *principal ideas treated* in the chapter. When you have thus gone over the *entire chapter*, noting the principal ideas that are discussed and illustrated, go over your rough outline or the points marked in your text, arranging them in an outline that shows the logical relationship of all important points made in the discussion. In your first reading of the chapter read rapidly and look only for the most important points made in the assignment. After a little practice you will be able to analyze and arrange in this logical way the contents of any chapter as you read it.

To determine accurately the efficiency of this method of reading your text and its advantage over your natural method you must (1) obtain a list of all the important points which this method of study enabled you to recall (see Experiment VIII, Chapter IX); (2) make a list of all the important ideas stated by the author in the chapter you studied; (3) divide the number of points which

this method of study enabled you to retain and report by the actual number contained in the chapter, your standard. This will give the per cent of efficiency for this method of study, disregarding the amount of time spent in the preparation. To determine which of the two methods, your natural method or the method described in this experiment, is the more efficient, divide the percentage of efficiency you obtained for each method by the total time (number of minutes) spent in the study. A comparison of these quotients will reveal which method is the more economical for obtaining the facts presented by the author you studied, provided of course that the materials read in each case are of about the same degree of difficulty and equally familiar to you. Care should also be taken to see that the points used in making your calculations are of about the same degree of difficulty.

Results. Compare the results obtained in this experiment with the results obtained when you used your own natural method of study, and answer the following questions:

1. Did you find any appreciable improvement when you used the method recommended in this experiment?
2. If so, to what is this increase in ability to master your assignments due?
3. What other things may be done to improve your ability to obtain and recall what an author presents in a text?
4. Make a careful list of all the things that really help you in this type of work.

Near the end of the term or after studying Chapter XVII you should repeat this experiment and compare your results with those obtained in previous experiments. It is important to keep an accurate record of everything that aids you in doing this type of work. By means of the technic you used in this experiment you may also keep accurate track of the *relative* value of *each thing* that you find helpful in doing this kind of work.

In the remaining chapters of this book you will be given additional help for dealing in an effective way with this problem and other problems which you meet as a student. You should, therefore, plan to study carefully all the suggestions presented, but it must not be forgotten that all knowledge concerning effective habits of work must be *used* to be of any value to you for increasing your personal

efficiency as a worker. It is also well to remember that such measurements as are recommended in this experiment act as an incentive to further effort and should, therefore, be used as much as possible.

EXERCISES AND QUESTIONS ON THE TEXT

1. What is meant by standardizing the conditions under which we must live and work?

2. Point out the importance of standardizing the external conditions under which you work.

3. Give two or more examples of situations in which the external conditions under which a given bit of work is done have been standardized or made favorable for the work to be done.

4. Name three types of conditions that should be standardized as far as possible.

5. Briefly discuss how one may proceed to keep himself mentally and physically fit for his work.

6. Explain why the external conditions under which we must live and work should be made as favorable as possible.

7. Explain why a time and place habit for work should be formed.

8. What is the normal effect of distracting stimuli? How may they be eliminated or kept down to a helpful minimum?

9. Explain how a student or worker may make a helpful adaptation in the use of his eyes.

10. How may one standardize the materials and equipment used in his work? Discuss briefly the importance of this.

11. What is the normal effect of the weather upon our ability to work? To what factors in the weather are these effects due?

12. What practical and helpful adjustments may be made to this group of stimuli?

13. How may one measure or check up on the relative value of the things he selects to do?

14. Briefly discuss the importance of this element in the personal efficiency of a worker. How may progress in this phase of efficiency be measured?

15. Explain how one may proceed to measure the progress that is being made in learning to read more effectively or in preparing an assignment in a text.

16. Describe briefly what one may do to acquire an effective method of preparing such an assignment.

17. What suggestions can you make for improving Experiment XIV, especially in the matter of determining the number of points made by the author read, listing the points which the reader remembers, and selecting materials to read that are of the same length and degree of difficulty? Just how would you proceed to improve this experiment?

REFERENCES

- DEXTER, E. G. *Weather Influences*. The Macmillan Company, New York, 1904.
EMERSON, HARRINGTON. *Twelve Principles of Personal Efficiency*, chap. xi.
The Engineering Magazine, New York, 1917.
McMURRY, F. M. *How to Study, and Teaching How to Study*, chap. vi.
Houghton Mifflin Company, Boston, 1909.

CHAPTER XVI

DEVELOPING AN INTEREST IN YOUR WORK AND IN YOUR OWN ADVANCEMENT AND SUCCESS

The most important set of conditions which a worker should seek to make favorable and control is his general attitude toward his work, his attitude toward his success, and his attitude toward his own advancement in learning how to work more effectively. These psychological conditions have such a marked and continuous effect upon one's ability to succeed with his tasks and upon one's power to improve his present methods of work that they should be fully discussed and their relation to personal efficiency carefully pointed out.

1. IMPORTANCE OF DEVELOPING A RIGHT ATTITUDE TOWARD YOUR TASKS AND WORK

As Professor Jennings has shown, a stentor¹ when it is busily engaged in seeking food or when it is making an appropriate response to a particular stimulus will not react to another stimulus that under other circumstances would produce a definite response. It seems under such circumstances to be physiologically "set," as it were, toward a certain type of movement and to the particular stimulus that is acting at the time and so fails to respond to the new stimulus that has been injected into its immediate environment.

In like manner a hungry cat or rat placed in a puzzle box or maze shows by its every movement that it is, as an organ-

¹ A small free-swimming unicellular animal. See Jennings, *Behavior of the Lower Organisms*.

ism, set toward a particular type of response, an adjustment which persists until it succeeds in getting out of the box. A sleepy and well-fed cat will, on the other hand, be set less toward escape movements when confined in such a puzzle box or maze. It is less ready to act and will not respond to the cage and the food on the outside so vigorously or continuously as does a hungry cat. In such cases a psychophysical adjustment or physiological state is set up within the organism which helps to determine what responses the animal will make and which drives it on to make a particular type of movement that is continued until the animal attains an end that may be said to be desired only in a physiological way.

The same principle operates in a greatly extended way in the field of human behavior and learning; for here a purpose, an idea, a desire, some mental attitude, or general feeling-tone may serve as an inner stimulus that helps to determine what reactions a student or worker will make when confronted by his tasks.

A study made by Gilchrist to determine the extent to which praise and reproof affect a pupil's work in school showed that the mental attitude set up in the minds of his subjects by ordinary praise and discouragement had a very marked effect on the character of the work that these pupils would do in school. Those he definitely encouraged made a gain of 79 per cent in their regular school work; those he discouraged showed a deterioration in their work of 6 per cent.

Rose L. Fritz, when she had won the world's typewriting contest in 1906 by writing 82 correct words each minute for one hour, told the director of this contest that she had reached the human limit for this type of work, that this was as fast as any human being could ever learn to write. But when Mr. Kimball told her that this was not the limit for this type of skill and assured her that this record would be surpassed and made her believe that it could and must be done, she succeeded during the next two years in raising the world's

record for typewriting, first, to 87 correct words written each minute for one hour and then to 95.¹

The action of this principle is further illustrated by the results of a study made in the psychological laboratory of Indiana University to measure the comparative importance of certain character traits in contributing to success in school. This study showed that the success which children attained in their school work was determined quite as much by the attitude which these young people had toward their teachers and toward their work as it was by their general intelligence or ability to learn, and in Chapter VII it was shown that unskilled clerks in the United States census department could learn to do in three days what it had taken skilled clerks five weeks to learn, because the former did not know that the task was supposed to be difficult, while the latter had from the start regarded it as a very difficult and fatiguing task.²

(1) *Motivating your Work*

The responses which a student or worker will be able to make are, therefore, very different if he is vitally interested in his tasks from what they will be if he is not or if he believes them very difficult to perform or that they are not worth the time and effort that it takes to perform them. In fact, the responses of a worker are determined at any given moment quite as much by his attitude toward his work, by his wishes and desires, by his purposes and plans, as by the problem with which he is occupied at the time or by the external stimuli that are operating. No case of learning or work can, therefore, be accurately described by a simple equation involving the worker on the one hand and the problem or task on the other. Much depends upon the worker's interest in

¹ The world's record in typewriting is held today (1925) by Albert Tangora, who wrote in 1924 at the rate of 147 correct words each minute for sixty consecutive minutes.

² Compare Chapter VII, section 5, (4).

his task, upon his attitude toward success, and upon his desire for further improvement. Even a cat, according to its age, stage of hunger, vitality, sleepiness, and the like, will be in one or another physiological attitude toward the cage in which it is placed, producing a psychophysical adjustment that helps to determine the responses that it will be able to make when exposed to the stimuli that come from the cage and the food purposely left on the outside.

It is important, therefore, to determine just how a student must proceed to develop a greater interest in his work, and to ascertain how interest in a particular school subject or task may actually be acquired.

(2) How Specific Interests are Aroused

If interest in our tasks is so valuable for success, we should know how it may best be aroused and maintained until we have completed our work.

When asked to enumerate the most serious difficulties which they were encountering in their work, 84 per cent of the five hundred students questioned at Indiana University in the fall of 1924 stated that the chief difficulty encountered in their work was their inability to concentrate their minds and efforts upon their work. When carefully analyzed this difficulty meant that the work to be done or the subjects to be studied were not interesting them or that they were not deeply enough interested in these subjects to become completely and spontaneously absorbed in their work. To meet this situation in a successful way and to remedy it one must determine how such an impelling interest may be aroused and maintained. To give help on this point we shall first inquire what interest really is, then explain how it may be aroused or be attached to a particular subject or task.

a. What interest really is. Interest has been defined as "the impulse to attend"; as "the recognition of a thing which

has been vitally connected with our experience before, a thing that is familiar or old"; or as "a natural tendency to act." One author says, "The root idea of the term seems to be that of being engaged, engrossed, or entirely taken up with some activity because of its recognized worth." Dewey stated that it marked the annihilation of the distance between the person interested and the materials and results of his actions. According to him interest is the sign of this organic union between the subject possessing the interest and the object or materials he works upon. Other writers have made interest synonymous with the feelings of satisfaction or pleasure that *always* accompany spontaneous and successful attention. Such a feeling of pleasure may be said to be the sign in our own consciousness or mind which notifies us that we are in reality growing interested in a subject or task. And since this attitude or interest is so important for success in the performance of any task, we should earnestly seek to acquire it in connection with everything that we attempt to do.

b. How interests are really acquired. All our early interests are hereditary, but most of the interests of an adult have been acquired during the course of his experience and training, as Professor James has pointed out. He says :

An adult man's interests are almost every one of them intensely artificial; they have been slowly built up. The objects of our professional interests are most of them in their original nature repulsive; but by their connection with such natively exciting objects as one's personal fortune, one's social responsibilities, and especially by the force of inveterate habit, they grow to be the only things for which in middle life a man profoundly cares.

If this be the case, we may make our interests practically what we will if only we know how. But to do this we must follow a definite course and obey the laws which control the acquisition of the habits of attention and feeling toward the subject or task which we call our interest.

A careful examination of how man's interests have actually been acquired reveals the fact that the process takes place according to a few very simple yet definite laws. First and foremost of these is the law that *in the beginning acquired interests are built upon the native interests or tendencies to respond which we inherit*. To acquire an interest in a particular school subject or task we must, therefore, appeal to some of these native interests and attach the new subject or task as closely as possible to one or more of these inner tendencies to spontaneous response that determine our action; for example: (1) It would be helpful in acquiring an interest in a particular subject which did not naturally attract or please us, if we would watch persons who are intensely interested in that subject, who are enthusiastic about it and ambitious to excel in that type of work, then purposely try to imitate them. (2) One might also try to introduce into his tasks an element of sport or a love of the game by imagination or other means. (3) One might also try to beat his record of the preceding day or week and so make a direct appeal to one of the strongest native interests that we possess. (4) One may develop an acquired interest in any subject or task by keeping in mind the rewards to be gained from the work and by painting for himself vivid pictures of himself enjoying them.

The author once succeeded in this way in getting a high-school boy permanently interested in the study of Latin, a study which he utterly detested. This was accomplished by appealing to the boy's desire to be a successful physician and surgeon. That he was intensely interested in this goal was known. But the boy felt and frankly told the principal that he saw no earthly use in studying this subject. In fact, he disliked it so much that he could not apply himself successfully to its study. In the attempt to build up an interest in this subject he was asked to go to a certain drug store in the city, where he regularly loafed, and to copy on a piece of paper the names of fifty drugs which he found on the bottles in the shelves;

also to make a list of the names of fifty important diseases selected from the books found in the office of his favorite physician; and to bring these two lists to the principal's office for consideration and discussion on the following afternoon. When the young man saw that practically all the names he had written were either Latin terms or of direct Latin origin, he got a sufficient incentive from this knowledge to apply himself to the study of his Latin well enough to succeed with this subject. This activity and success soon developed a natural interest in this subject through the action of a *second* law which helps to govern the acquisition of all the interests one ever acquires.

This law may be stated as follows: *In order to develop an interest in a subject, secure information about it.* This principle is appealed to when an advertiser or salesman gives his prospective customers important information about the article he wishes them to buy. It is the law that has been appealed to in building up in every scientist the keen interest which he manifests in his specialty. That is to say, a scientist's interest in his specialty consists in large measure of the knowledge that he possesses in this field. The author, for example, was not always interested in psychology, but by the steady accumulation of facts in this field he has developed an interest in this subject that amounts almost to passionate absorption, an interest that has completely overshadowed, even eliminated, most of the native and acquired interests that formerly dominated his conduct and thought.

In order to show how an interest may be developed in a particular subject, Dr. Kitson has chosen a college subject that is generally regarded as so difficult and abstract that not many people are interested in it, the subject of philology, or study of language as a science. He says:

Let us imagine that we are trying to interest a student of law in this subject. As a first step we shall select some legal term and show what philology can tell about it. A term frequently encountered in law is indenture — a certain form of contract. Philological

researches have uncovered an interesting history regarding this word. It seems that in olden days when two persons made an agreement they wrote it on two pieces of paper, then notched the edges so that when placed together, the notches on the edge of one paper would just match those of the other. This protected both parties against substitution of a fraudulent contract at time of fulfillment.

Still earlier in man's development, before he could write, it was customary to record such agreements by breaking a stick in two pieces and leaving the jagged ends to be fitted together at time of fulfillment. Sometimes a bone was used in this way. Because its critical feature was the saw-toothed edge, this kind of contract was called indenture (derived from the root *dent* — tooth, the same one from which we derive our word dentist).

The formal, legal-looking document which we today call an indenture gives us no hint of its humble origin, but the word when analyzed by the technique of philology tells the whole story, and throws much light upon the legal practices of our forbears. Having discovered one such valuable fact in philology, the student of law may be led to investigate the science still further and find many more.

Such information may arouse enough activity and curiosity in this student of law to enable him to apply himself still further to this subject. By seeking additional information in this field of research and relating it to his former experience or applying it to his practical needs a genuine interest in this subject will be aroused.

This successful use of the information obtained calls attention to a third law of interest; namely, the fact *that we must arrange matters so that we can and will succeed with all our work*. No genuine or lasting pleasure can be attached to a subject or performance unless the learner can succeed with his tasks. New things must be stated in terms of the old; the unknown in terms of the known. In the case of interesting the student of law in the subject of philology he was not only given new knowledge and information, this information was given him

in terms of a fact that was both familiar and interesting to him. Unless this principle is followed and the student kept succeeding most of the time, no genuine interest in the subject can be developed. That is to say, genuine success is required to make a student or worker *exert himself fully and vigorously toward his task*, which is the final and most important of the laws that control the development of what we call interest in a particular subject or task.

The operation of this last law in the development of interest is well illustrated by a story recently told the author by one of the leading superintendents of schools in the United States. In discussing how interest in a particular subject might be aroused he described how the best teacher he had ever studied under proceeded to develop it in a class in general science in the high school. This teacher, he said, always began with an object that was thoroughly familiar to all the members of his class. One day it was a bean which they put to soak and watched sprout and grow during succeeding days. While this was going on they dissected another bean and determined the structure and function of its general parts: the hard outer shell, the inner covering, and the food portion stored inside these coverings, which the young plant consumes as it grows and develops a way of extracting its food from the soil and the air.

The next week this teacher asked each member of the class to bring a hard-boiled egg for inspection and study. All now readily discovered on the basis of what they had done with the bean the hard protective shell on the outside, the inner lining, and the mass of food on the inside for the embryo chick, which they later watched develop from another egg as the experiment proceeded, discovering a principle which governs an important life process in both the plant and the animal world.

On another occasion the class was given a bit of information about a certain plant that was dissected and studied in class, after which the author of our story and another pupil were

asked to go to a certain swamp some seven miles distant to secure for the use of the class the next day another closely allied plant, the skunk cabbage, which they were told was exceedingly rare in that community. Just enough information had been given these boys to arouse their curiosity about the new plant and to enable them to identify it by its peculiar odor. Their native and previously acquired interests were appealed to by having them use the principal's horse and buggy for driving seven miles in the country after the plant and by the fact that they were made responsible for securing a new specimen for class use on the following day.

That these and a score of other similar incidents were remembered thirty years later by this man and by all members of his class when he told the stories in a commencement address in that same city is proof of the keen and successful interest which this great teacher had developed in a class of fourteen young men and women by the application of the simple rules which we have listed above. (1) He had them secure definite information about each subject or object they studied. (2) He always made his appeal to some native interest or to their acquired interests by stating the new in terms of what they already knew or had already done. (3) He made it possible for them to succeed with everything he asked them to do. Lastly, (4) he had each student *actively engaged* on some project or bit of work, that is, exerting himself actively toward each problem they took up for study. In fact, so successfully was this done, and so great was the interest aroused in each subject taken up, that this superintendent's mother and younger brother joined in practically every experiment that was taken up by this class in school, an experience that, according to the author of our story, was duplicated in practically every home represented in the class.

c. How to develop an interest in a particular subject or task. Such methods *will develop* an interest in any subject or task. If, for example, you desire to become interested in psychology

or in learning how to work in a more effective way, keep actively engaged in the study of this subject. Read all the books and articles you can find on this subject. *Apply* all the knowledge you gain to the study of your other subjects. Choose topics from this field as subjects for your themes in English composition. Try to help some other student in the class. *Take an active part in the class discussions* and discuss important problems in the field with other students and with your instructor. Use your ingenuity to devise methods of keeping yourself active toward this subject, and above all plan your tasks and work so that you will succeed with all that you undertake. Presently you will find that this subject will lose all its disagreeable features and fairly bristle with significance and interest; this will serve as a stimulus to urge you on to even greater activity in that direction and so, according to the laws we have already stated, create still further enthusiasm and interest, the chief factor in producing success in every line of human activity.

When such an interest in a particular subject has been developed, a student or worker perceives new relationships between this bit of work and his future aims. That is to say, his work will be viewed as a necessary part of his life purpose and he will be continually encouraged by the many new things which his study reveals, even intoxicated with his successes and the pleasure to which they normally give rise. This naturally causes him to delve still deeper into that subject until he emerges as an authority or expert in that field.

(3) *How to Develop an Interest in your Work taken as a Whole*

To become interested in your work as a whole you should learn to see more in it than the mere task itself. Special incentives must be invoked to make up for the natural inner urges and feelings of pleasure which so often are lacking in one's regular work. Such incentives may come (1) from the thought

of better wages or some other reward; (2) from a contemplation of the possibility for promotion; (3) from the thought of being master of your tasks or work taken as a whole; (4) by thinking of your work as a part of the game of life in which all naturally desire to excel; (5) by keeping a closer account of your actual output, thus placing yourself in competition either with yourself or with your fellows or both, thereby appealing to one of the strongest native urges that affect man's ability to release and direct his energy and power; lastly, (6) by dwelling on the desire to be of the highest degree of usefulness to yourself, to your family, to your city and state, or to humanity as a whole, then thinking of your tasks as a necessary means for attaining this desirable end. This would make an appeal to one of the strongest and most persistent inner tendencies to action which affect the behavior of the human race.

Each student and worker should determine for himself all the incentives of this sort which he may successfully use, for an appeal to any one of these instinctive urges is very effective, as the following examples will show.

Dr. Kitson made a study at Indiana University of the output of forty hand compositors in the printing industry while they were working under the influence of a particular wage incentive and found that an appeal made to this particular incentive produced an almost unbelievable effect on the output of this group of skilled workmen.

A record of the actual output of these forty men was taken by the establishment in which they worked one week after they began to work in the plant, then again at the end of their fourth, eighth, twelfth, sixteenth, and twentieth weeks of service. The average time that these workmen had been engaged in the printing trade as journeyman printers when the experiment began was 10.3 years. But notwithstanding this fact, the average increase in the daily output of these seasoned printers, when working under the influence of this definite wage incentive, was 78 per cent. Each individual increased

his output during the first twenty weeks, some of them as much as 289 per cent. All but one of these workmen increased his rate of work beyond the bonus point, which was set far beyond the best initial achievement of any of these men. Under the influence of the idea of getting more pay for all the work done over a certain amount (the bonus point) the average output of these men reached this bonus level in four weeks, and all continued to increase their output during the next four months, some slowly, others more rapidly. The ablest workers showed the most rapid improvement, but the individuals who had the lowest initial score improved for a longer period of time. Both groups attained about the same degree of proficiency in the end, and Dr. Kitson believes that this particular incentive to improvement ceased to have its former stimulating effect at about this point.¹ We may conclude that the appeal made to a definite reward couched in the form of this increase in their daily wage so changed the attitude of this group of workmen that they were able to increase their daily output of work 78 per cent by inventing new and more effective methods of work.

The other incentives we mentioned — possibility of promotion, thought of being a master in your chosen field of work, rivalry, the thought of service to humanity or to the state, etc. — if properly appealed to will have an equal or even greater effect upon the worker's ability to improve in his chosen field of work.

Knight and Remmers² measured the ability of 10 freshman students to add, who had been specially interested by their fraternity in making a record score on these tests, and compared it with the record made by 54 junior students who

¹ H. D. Kitson, "A Study of the Output of Workers under a Particular Wage Incentive," in *University Journal of Business*, Vol. I, pp. 54-68.

² Compare F. B. Knight and H. H. Remmers, "Fluctuations in Mental Production when Motivation is the Main Variable," in *Journal of Applied Psychology*, Vol. VII (September, 1923), pp. 209-223.

were not specially motivated in this way. The juniors worked under the most favorable conditions of classroom instruction and were tested at 8 A.M. The freshmen, who had been hazed by their fraternity for a week preceding the test, had been allowed to sleep only two hours each night during that week and took their tests at 10 P.M. But the freshmen were specially interested in making a record score on the test by being told by the president of the fraternity that they "were to push themselves to the limit, as their scores on the test were involved in their final election to the fraternity." The juniors were not so motivated, but were merely told to do their best on the test. Under the conditions of this experiment the freshmen made an average of 21 columns of addition for each five-minute period of work, while the juniors made an average of only 11 columns.

This difference, the authors believe, is due to a difference in the mental attitude, or "set," aroused in the two groups of students by the conditions of the experiment. They conclude:

The difference between a genuine motivation such as the freshmen had, and the kind of motivation provided by the average college class, is a difference which not only offsets extreme fatigue, but further offsets freshmen *vs.* junior ability, and in addition produces twice as much work per unit of time with equal accuracy.

A student or worker should therefore use the incentives which appeal to him most. He should develop the habit of painting for himself an alluring mental picture of his enjoyment of the particular phase of his work that interests him most. He should then take the additional step of dwelling upon this most alluring feature of his work; he should talk it over with himself in private, stating audibly to himself his desires in that direction. He should also assert his confidence or belief in his ability to succeed and often express his determination to attain this desirable goal, even to naming and dwelling upon his interest in this expected reward. If the

reader will earnestly and continuously urge himself on to greater effort in this way, the gains will follow in the form of increased power, greater enthusiasm, and increased ability in that line of work, as it did in the case of Kitson's printers and the freshman students tested by Remmers and Knight.

It is even helpful to go one step farther and to write down all these things for your own inspiration, encouragement, and direction, as you were urged to do in Chapter XIII. But for the reasons which have elsewhere been given¹ you should act promptly upon every desire and resolve, for this not only strengthens your desire but tends to make permanent the inner urge represented by that impulse or resolve, making future action in that direction much easier and more certain. The reading of a book, a story, an essay, or a poem, the hearing of a play or a concert, the reading of this chapter, or holding in mind some train of ambitious thoughts may arouse in your mind an intense and enthusiastic desire to pursue a certain course of action. The best thing to do at such a time is to act immediately. If this cannot be done, you may crystallize your impulse to a certain extent and project it into the future by writing down, in the form of a definite plan, just what you propose to do.

2. DEVELOPING A RIGHT ATTITUDE TOWARD YOUR SUCCESS

(1) *Importance of Believing that you can and ought to Succeed*

It is, however, not enough to be interested in your tasks or work taken as a whole. No worker can do his best work unless he believes that it is possible for him to succeed. This attitude toward success is born of previous successes and is in direct proportion, so far as its strength and persistence are concerned, to the habit of succeeding that has already been

¹ Compare Chapter IX, section (5).

established by your previous successes. This is well illustrated by the following case taken from the author's experience as a teacher in the public schools.

A ten-year-old girl in the building where the writer was principal was doing such poor work that her case was brought to the attention of the principal. Investigation showed that this girl was trying very hard but could not learn to spell the words assigned her and that she was failing in arithmetic. She was keenly conscious of her inability to succeed and frankly told the principal that she could *never* learn these subjects, no matter how hard she tried. Because of her failure at school she was frequently punished at home, sometimes severely. When the principal talked to her mother, the latter promised not to punish the girl again for her failure in school. Special work that was very easy for this girl to do was then arranged by the principal and teacher and she soon found to her delight that she could accomplish all the work that she was asked to do. In the course of a week her whole attitude began to change. She became happy and more confident that she could do all the work that she was asked to do. This program was continued for several weeks, and when she was gradually put back on the regular work of the grade in which she belonged she found to her great surprise and delight that she could do this work too. She was given no extra help by her teacher, but was always given tasks that she could do, a program that was continued until her confidence in her own ability to succeed was fully restored. This difference in her ability to succeed was due entirely to her attitude toward herself and toward success. Before the experiment began she believed that she was going to fail. As the experiment proceeded she became more and more confident that she would be able to succeed with all her tasks. In the course of a few weeks her whole attitude had changed. Her deportment had improved; she began to take a keen interest in play and games; her excessive nervousness had disappeared, and her

mother came to school to inquire "what in the world had been done to perform this miracle on Helen."

There was no miracle about the case. The little girl had simply been given things to do which she could do well. This gradually changed her attitude toward herself and toward her tasks and developed the belief that she could succeed with everything she was asked to do. The teacher was careful to make assignments that would enable the girl to succeed with all her tasks. This gradually developed the habit of success and changed her whole attitude toward her work. The marked improvement in her ability to work was due entirely to the fact that the gloom of failure was supplanted by an atmosphere of confidence in her own ability to succeed, born of actual success with the work that she was asked to do.

The principle operates throughout the whole realm of human and animal learning. An old cat first brings dead mice for her kittens to play with. The kittens growl and stick their tiny teeth into the bodies of the unresisting mice. Later, mice are brought that have been partially disabled by the mother cat, and the kittens have some resistance to overcome. Finally, uninjured mice are brought, and if they escape from the kittens they are promptly caught by the mother cat and disabled enough to enable the kittens to handle them unaided. In this way real confidence and the ability to catch and handle live mice are gradually developed.

Any student or worker who desires to improve his present methods of work must therefore select and plan his tasks in such a way that he can keep himself succeeding most of the time. Nothing is more withering for a worker than to acquire the habit of failing with most of the things that he attempts to do. This creates the belief that success is impossible, which paralyzes his efforts, destroys his enthusiasm, and closes the door to further improvement in that direction.

(2) *How This Most Helpful Attitude toward Success
may be Acquired*

The belief that success is possible for us can be developed and maintained only by planning our tasks in such a way that we can succeed most of the time or by adjusting our work to our ability and training, as is done by a mother cat when she trains her kittens to catch mice, and by every good teacher who succeeds in drawing out of his pupils all that they are capable of doing in the type of learning which he directs.

The best way to make a maximum record in any line of work is, therefore, to believe that you can and should succeed with this work. This attitude can best be aroused by developing the habit of succeeding with all your tasks and by dwelling on their importance or value for you. To develop such a habit your tasks must be so carefully planned that they can be done promptly and well. Such planning also makes it possible to measure the progress you are making in doing your work, and so makes an appeal to incentives that can be aroused only by the knowledge of your successes. The latter produces a feeling of pleasure which spurs you on to still greater and more continuous effort in that direction.

It is the mental attitude born of such success as this that makes an individual able to do the seemingly impossible things which so many men and women do in every field of human achievement. Careful planning and adjusting one's tasks to one's ability and skill will enable him to succeed with his work. This repeated success strengthens his will and convinces him that he can succeed, enabling him to use all his energy and powers in an effective way. If such an attitude toward success is lacking, a worker's progress will be arrested on a plane of achievement far below that which might have been attained if a proper adjustment had been made toward this important psychological factor.

3. DEVELOPING A RIGHT ATTITUDE TOWARD YOUR OWN ADVANCEMENT

(1) *Practical Value of Being Interested in your Own Advancement*

Of greater importance still is the interest which a worker may develop in his own advancement. To obtain the best results in any type of learning a student must not only be interested in his work, believe in its practical importance for him, be convinced that he has the ability to succeed in all his tasks, he must be interested in making further improvements in his present methods of work and believe that such gains may be made and that it is decidedly worth while for him to make them. Unless a student or worker is genuinely interested in making such gains, the most efficient methods of performing his tasks cannot be acquired and used.

This fact was experimentally demonstrated by the author's study of incentives to learning.¹ In this investigation one hundred and twenty-four college students were given seventy-five practices in each of four different types of learning. In order to measure the effect which interest in improvement might have upon a learner's progress these subjects were divided into two sections: a control group and a stimulus group. During the first two thirds of the practice in the first type of learning studied one of the sections was made a stimulus group and interested as much as possible in the progress it was making from test to test. The other section was made a control group for this period of practice, and the conditions of work arranged so that these students could not possibly become interested in the gains they were making from test to test. At the end of the fiftieth practice these conditions were reversed. The group that had been interested in its advancement was now made a

¹ Compare W. F. Book, "The Will to Learn," in *Pedagogical Seminary*, Vol. XXIX (December, 1922), pp. 305-362.

control section, and the former control group which had not been allowed to become interested in its advancement was made a stimulus section and interested as much as possible, during the remaining twenty-five practices, in the gains it was making. For the next type of learning studied these conditions were reversed. The section that had been made the stimulus group for the first fifty practices in the first type of learning was here made the control group, and conditions arranged so that its members could not become interested in the gains they were making from test to test. But the section that had been the control group in the first part of the practice in the first experiment was now made the stimulus group and interested as much as possible in its advancement. At the end of the fiftieth practice these conditions were reversed as in the first experiment, so that each section became both a stimulus group and a control group for each type of learning studied. In two types of learning each section served as a stimulus group for the first two thirds of the practice and as a control group for the last third of the practice. In the other two types of learning studied each section was a control group for the first fifty practices and a stimulus group for the last twenty-five practices taken. In this way each section was first made a stimulus group and then subjected to the opposite set of conditions in the remaining practices in each type of learning studied, and the kind and amount of effect produced on each learner's score by each set of conditions were definitely measured.

The results obtained in the four widely different kinds of learning studied were uniform and convincing. (1) In each type of learning the stimulus groups made more rapid gains with a given amount of practice than did the control groups. (2) These stimulus groups made rapid and continuous improvement as long as they were being definitely interested in their own advancement, and ceased suddenly to improve when subjected to the opposite set of conditions at the begin-

ning of the fifty-first practice. (3) The control groups, on the other hand, not only made less improvement during the first fifty practices than did the stimulus groups, but they began suddenly to make more rapid gains as soon as they were definitely interested, at the fifty-first practice, in their improvement as such, and continued to improve rapidly and continuously to the end of the practice, while the records for the sections that had been made a control group for the last third of the practice showed a sudden decline in score at this point and their records remained far below the scores made when they were being interested in their own improvement (compare Fig. 11).

In every case the individuals who were being interested in their own advancement by the conditions of the experiment made a higher percentage of gain in each of the types of learning studied than did those who were not. And what seems more significant still, the stimulus groups made fewer errors in their work, which would seem to show that the individuals who were being especially interested in their improvement not only did more work but did it better than those who were not so interested, because they increased both in accuracy and in speed of work, while those not interested in their own advancement not only ceased to improve at this point but became more careless in their work. As soon as these conditions were reversed these same individuals began at once to increase both their accuracy and their rate of work. Moreover, those who made the best record at the beginning of the experiments made the most marked improvement, indicating that the more capable students profit more by being thus definitely interested in their advancement than do the less capable ones. This is probably due to the fact that these brighter individuals, if definitely interested in making further gains, are better able to originate and to select new and better methods of work than those possessing less natural ability.

We may conclude that if a student or worker wishes to

improve his methods of work or to make definite progress in the type of learning treated in this book, *he must somehow become definitely interested in the proposition of making further*

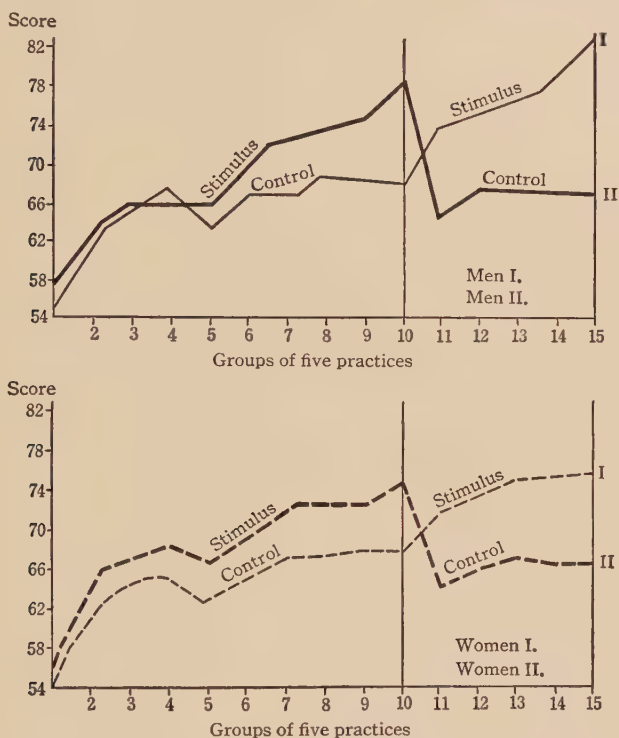


FIG. 11. Effect of interest in improvement upon the rate of gain made in learning

gains in this type of learning, because such an interest helps him in originating new and better methods of work and also aids him in selecting and fixing these more advantageous methods of work.¹

¹ Compare W. F. Book, "The Will to Learn," in *Pedagogical Seminary* (December, 1922), pp. 350-361; also the same author's *Learning to Typewrite*, pp. 366-381. The Gregg Publishing Company, New York, 1925.

The learner must also believe that further improvement can be made and that it is to his personal advantage to make it. Numerous instances were observed in the study referred to above where individuals had ceased to improve for six or eight practices and had, therefore, decided that no further gains could be made. But they began again to improve as soon as they were assured by the assistants that they could and really ought to continue to improve. In a few instances an error made in counting their score, because they had recorded several more points than they had actually made, gave them this necessary confidence in their ability to make further gains. In every such case that was noted these individuals not only equaled this spurious score in the next test but actually surpassed it in succeeding tests by the usual amount of gain, whereas before they had failed to improve for several consecutive tests.

If this be at all typical of the influence which interest in one's own advancement produces, it is important for all learners and workers to understand (1) how such interest in improvement may be aroused; (2) how one's confidence in the possibility of making further gains may be strengthened or how he may be made to believe that it is actually possible for him to make further improvements in his methods of work; and (3) how a desire for this sort of improvement may be maintained until such gains can actually be made.

(2) *How a Learner's Interest in his Own Advancement may be Aroused and Strengthened*

The surest and best way to arouse an interest in making further gains in learning to do your work in a more effective way is to feel a practical need for such improvement. We are all vitally interested in self and naturally notice and dwell upon the things that seem of direct practical value for us. We shall, therefore, become interested in making further im-

provements in our present methods of work if we feel that it is to our advantage to do so or if we are sufficiently dissatisfied with our present methods of work. This drives us on and makes us vary our procedure until we invent a new and better method of performing our tasks or our work taken as a whole.

If in addition we are shown by actual measurement that such an interest in improvement helps to bring it about, as the results of the experiments quoted above so clearly show, we shall naturally become more interested in our advancement and develop a mental attitude toward our success that helps to bring it about.

But to arouse and maintain such an interest in the gains you are making, actual measurements must be made, measurements that will show both the kind and the amount of improvement that are being made. This is why the author of this book has attempted to introduce for each principle of personal efficiency discussed a method of measuring the advancement that is made by the learner in that particular source of improvement. A knowledge of the results that are actually obtained will enable him to become dissatisfied when no gains are made or when insufficient improvement is made, and encouraged or pleased when suitable advancement *is* made in one or more of the sources of improvement. This serves as an incentive which enables him not only to release more energy but to direct it more efficiently in the performance of his tasks. It also enables him to invent new and better methods of work by varying his procedure until such methods of work are originated. It also enables a worker to select more promptly every new and advantageous adaptation in method which he invents and so to link it more easily and surely to the appropriate stimulus. Such methods of measurement will also enable a learner to determine when he is making a normal, superior, or inferior rate of progress, as the case may be, by comparing his advancement with a reliable standard or norm.

(3) *How a Learner's Interest in his Own Advancement may best be Maintained*

One of the most successful ways of maintaining this helpful attitude toward your own advancement or of maintaining the other attitudes mentioned in this chapter is through the formation of a definite life purpose or creed which, because of its brevity and clearness, may easily be remembered and so serve as a constant reminder to you, making you focus your attention and efforts on the things which you really desire to achieve. There is no mystery about the development of any of these helpful attitudes or the habits that make one efficient in his work. They are all developed and fixed according to certain definite laws which must be obeyed if they are to be economically acquired laws which we have tried to illustrate and explain in the preceding chapters of this book. The remainder of the book will therefore be devoted to an explanation of how the principles which have already been explained operate in the performance of certain tasks which every student and most workers must perform every day.

4. SPECIFIC RÔLE PLAYED BY THE INCENTIVES AND MENTAL ATTITUDES DESCRIBED IN THIS CHAPTER

The psychological factors or mental attitudes which have here been discussed — interest in our tasks or work, belief in its practical importance, confidence in one's ability to succeed, interest in improvement as such, and belief that such advancement can and should be made — have a marked effect upon the responses that any student or worker will be able to make. (1) They help to determine what responses he will be able to make. The same worker will respond differently to the same situation or stimulus if his mental attitude is changed in the meantime. Fear of failure, and the belief that further improvement cannot be made or that it is not worth the time and effort that are required to make it, will prevent a learner

from making the desired response, as the author has elsewhere pointed out. (2) These mental attitudes also determine by what a worker will be pleased or annoyed. A student who plans to make only a passing grade in his college or high-school work will be pleased with an average mark. But if he is aiming to graduate with distinction and to make an A+ or A in all his courses, he would be greatly displeased with a record of C+ or C. It is, therefore, the standard or goal that a worker has set for himself at the time that determines whether he will be pleased or annoyed by the results which he achieves. (3) These attitudes and aims also aid one in selecting the most successful methods of work which he originates or invents. Every worker selects or repeats the things that aid him most in getting where he desires to go. His motives and desires, if sufficiently constant and strong, drive him on until this end-result is reached. When a more appropriate way of doing this work is originated by the ceaseless experimenting which these attitudes and desires force any worker to make, it can be selected because it fits in with his purpose or plan; that is, meets his inner needs at the time. If such a more favorable response cannot be made, the experimentation goes on until a better method *is* found. When this new and better way of performing the task is found, it can more readily be repeated because it meets the worker's purpose or inner need better than the older method, and the ceaseless experimentation stops, unless a desire for still further improvement is present to urge him on to invent a still more efficient method of work.

It is therefore the learner's attitude, or purpose, that determines the character of the responses he can make, that determines what feeling-tone his responses will produce, and that enables him to select from among the many varied responses which he makes those that best meet his present needs.¹

¹ Compare on this point W. F. Book, *Learning to Typewrite*, chap. xx, pp. 377-381.

It should also be pointed out that every student or worker always has some sort of attitude toward his tasks. It is important, therefore, to see that this attitude and his moods are helpful rather than obstructive. They are often suggested or induced in peculiar ways, as in the case of the skilled census clerks who got the idea that the work with a certain machine was very difficult and fatiguing. Students in college often get the idea that a certain course is unusually difficult or uninteresting and dry. Some sort of attitude toward your tasks is therefore always present. The wise and efficient worker pays particular attention to this point and sees that the attitude toward his work, toward his success, and toward his own advancement is favorable for what he desires to do.

EXERCISES AND QUESTIONS ON THE TEXT

1. Name and briefly explain the psychological conditions that affect human efficiency in study and other types of work.
2. What constitutes the most helpful attitude that one may have toward his work and tasks?
3. How must one proceed to motivate his work?
4. What is interest (1) on its practical side, (2) psychologically or organically considered?
5. Explain in detail how one must proceed to develop an interest in a particular topic or task. What laws control the acquisition of human interests?
6. How may one develop an interest in his work taken as a whole?
7. What is the most helpful attitude to assume toward one's success?
8. How may one's belief in his ability to succeed be strengthened? maintained? Why is this factor so important?
9. What is the most helpful attitude for a worker to assume toward his personal advancement?
10. How much and what kind of effect does one's interest in his progress normally have?
11. How may greater interest in one's own advancement be aroused and strengthened?

12. Name and briefly explain three ways in which a worker's attitude toward his tasks, his attitude toward success, and his interest in his advancement aid him in his work.

REFERENCES

- BOOK, W. F. *Learning to Typewrite*, chap. xx. The Gregg Publishing Company, New York, 1925.
- BOOK, W. F., and LEE NORVELLE. "The Will to Learn," in *Pedagogical Seminary*, Vol. XXIX (December, 1922), pp. 305-362.
- GATES, ARTHUR I. *Elementary Psychology*, chap. xvi. The Macmillan Company, New York, 1925.
- KITSON, HARRY D. "A Study of the Output of Workers under a Particular Wage Incentive," *University Journal of Business*, Vol. I, pp. 54-68.

PART IV

APPLICATION OF THE PRINCIPLES OF PERSONAL EFFICIENCY TO THE PERFORMANCE OF SPECIFIC TASKS

CHAPTER XVII

HOW TO PREPARE AN ASSIGNMENT IN A TEXT

Thus far in our discussion of learning to work in the most effective way we have described the principles that control personal efficiency in every field. We have tried to delineate the path which a learner in this type of acquisition must take to succeed. We shall next inquire how the work of a learner must be directed in order that these most efficient habits of work shall be acquired, and attempt to show how the laws which have already been discussed in Parts II and III of this book apply to the performance of certain kinds of work which every student is called upon to do every day. We may begin by discussing the last problem first.

1. STANDARD TYPES OF WORK WHICH ALL STUDENTS ARE REQUIRED TO DO

As everyone knows, there are a variety of things which every college and high-school student is asked to do; but all his tasks may be grouped into a few standard types of work which he is required to do over and over each day and week. If, therefore, we can show how the principles already discussed apply to the performance of each of these standard types of work, a student would be greatly helped in the performance of all his tasks because he would be shown how to proceed in doing certain typical things which every student is required to do.

Among such typical tasks may be mentioned (1) reading or mastering an assignment in a textbook. Over and over again, for his present information and for future use, a student is

required to get from a textbook or from several texts the knowledge there assembled. Learning to do this sort of thing in the most economical way may be called learning how to read effectively. (2) At other times a student is asked to acquire by observation and reading, or by listening to a lecture, new bits of knowledge which he is to judge, organize, and fix in mind for ready recall and effective use in the solution of the problems he meets in school and in life. Many things that a student encounters in his reading or that are presented in lecture form must in this way be memorized or learned verbatim. And the student must not only make these things a part of his permanent fund of knowledge, so that they may be used like the multiplication table, he must also learn to judge more and more accurately and quickly what things he should learn in this way and what things he should overlook and forget. This type of work we may call memorization of the facts that should be learned by reading, in lectures, or through the observations made in the course of our work. (3) Most of a student's work, however, in all subjects consists of making a critical study of particular topics suggested by his work or assigned him. These he should learn to investigate in an effective way. When confronted by such a task, he must seek information on this topic in many places, evaluate, organize, and assemble it in proper form for better understanding and for more ready use. He should therefore learn how to do this sort of thing in an economical way. (4) But often in connection with such a task or in connection with his regular work a student is required to solve a *new* problem or to recall and use certain knowledge and experience that he has already acquired in the solution of the problems which he meets in the course of his work or which have been given him by his instructors. This we may call learning to work in a scientific way, or learning to think and reason when confronted by a new problem demanding such a new and successful response. Lastly and always, (5) a student is con-

fronted by the problem of keeping himself fully and constantly applied to his tasks and genuinely interested in his work.

If we can succeed in showing how the laws already illustrated apply to the performance of these typical tasks, this last division of the book should prove especially valuable, since it would give to students some practical help for the solution of the particular problems which they are called upon to solve in the course of their work. We shall, therefore, next proceed to point out some of the things which a student must do to learn to read effectively, to memorize and organize the new facts to be learned in the course of his work, to make a critical study of a particular topic or subject, to use his knowledge and past experience to the best advantage in solving new problems, and to keep himself more fully and constantly applied to his tasks while he works.

2. LEARNING HOW TO READ EFFECTIVELY

As just pointed out, every student is often required to get from a textbook or from several texts, either for his present information or for future use, the knowledge there assembled. How may this be done in the most economical way? For the solution of such a problem all the principles discussed in Parts II and III of this book are pertinent and immensely helpful.

(1) *Standardizing the External Conditions under which you Work*

If this task is to be performed in the most effective way, the external conditions under which the work is done must be standardized or at least made favorable for the performance of this task, as was pointed out in Chapter XV. A definite time must be set aside for the work so that the worker may turn promptly and without interruptions or loss of energy to the preparation of this lesson when the time for it arrives. The

work should also be done in a particular place, a place where the worker will be as free from extraneous stimuli as possible and where by previous habit he has accustomed himself to work at this task in an energetic and consistent way. This makes it easier to keep his attention on the work and to apply his mind more effectively to this sort of work, because the law of habit is appealed to and used in the ways already described in Chapters IX and XV.

(2) *Keeping yourself Mentally and Physically Fit for the Best Type of Work*

A learner should also see that he is in proper mental and physical condition for the most effective work. This may be done by making a proper adjustment to the principles set forth in Chapter III: (1) by arranging, when you plan and schedule your tasks, for proper periods for recreation and rest; (2) by establishing proper habits of eating and sleeping; and (3) by arranging for suitable periods for relaxation during the time that your assignments are being prepared, thus preventing unnecessary fatigue. It is highly important to keep fatigue down to a minimum by providing for such periods for relaxation and for short periods of rest rather than to let fatigue accumulate unnecessarily by a neglect of this principle.

(3) *Determining the True Purpose or Aim of your Work*

When these physiological and objective conditions have been made as favorable as possible, the student should begin his work by making a careful analysis of his task, to determine the exact purpose or aim which should guide him in reading the assignment, then work with this goal-idea definitely in mind. The more specific and clear this purpose is and the more definitely and consistently it is held in mind as he works, the more effectively will his energy be applied.

There are, of course, many purposes which a student may

have as he reads an assignment in a text. (1) He may read it to ascertain whether it contains any information on a certain point in which he is particularly interested. (2) He may read it to determine whether the author has made any contribution to what the student already knows about the subjects treated or to what the student knows about the topic that is being discussed. (3) He might read it with the view of trying to make a good recitation on it the next day or to master it in a way that would enable him to answer questions on it at examination time. Lastly, (4) he might read it to determine what the author has said on the particular topics discussed and to relate this new knowledge to what the student already knows in such a way that it would enable him to use it in solving his own problems later on. The real purpose in studying a textbook should be to ascertain exactly what the author has contributed to each problem that he has discussed or to get this thought accurately from the printed page in the shortest possible time.

But the purpose, whatever it be, should be definite and clear and kept constantly before the mind while the assignment is being read, because it is very difficult to try to find, even in reading, something you are not looking for. This aim should be formulated by the student himself and really desired by him, for when specific and definite it serves as a basis for the selection and organization of all the pertinent facts which the author presents. The facts that have no direct relation to the reader's goal are discarded; those that are pertinent to his purpose are noticed, selected, and emphasized, and will, therefore, be more easily organized into a logical sequence, and better interpreted and retained.

If, for example, your purpose in reading the preceding chapter in this book should be to get all that the author had to say on the various topics discussed, or to understand all the important points treated in the chapter, you would naturally begin by determining the particular topics or ques-

tions that the author treats in the chapter. Then you would read it with these problems in mind, noting each important thing that is said about each of the problems discussed. These facts can then be easily organized around the particular topics that are being discussed.

(4) *Why This Goal should be Kept Definitely Before your Mind as you Work*

Such a purpose or aim serves as a real motive for the student because he is constantly urged on to see what the author contributes to the specific problems on which he is seeking information. It is because this goal-idea is so much more definite and so much more constantly held in mind in reading a novel that a student is able to read such a story more rapidly and intelligently than he reads other sorts of material. In the case of the story the purpose or end that is sought (what is to happen next, or happen to this or that character) is ever before the reader's mind, and he more readily obtains and remembers the things which bear on this point. If, therefore, you want to read an assignment in history or in psychology with equal interest and effectiveness, you must work in a similar way by getting your purpose definitely in mind and keeping it constantly before you while you work.

Such a problem, if definitely understood and kept in mind, also holds out to the learner the promise that the information obtained has some meaning and real use. Since it is being obtained for a definite purpose, it will be used and more easily related to what the student already knows. In fact, it is the reader's purpose that makes him plan to turn the information he is obtaining to some practical account, a step which is absolutely necessary for a thing to be properly learned, as we shall point out in Chapter XIX. Nothing is, in fact, really learned unless the student reacts to the facts that are being acquired, judges their relative worth, interprets them in the

light of his own experience, and emphasizes those that bear most directly on the problem that is being investigated at the time. The most important ideas are then selected and related to his own experience, in preparation for using them in the solution of other problems which he encounters in school and in life. Unless the reader seeks illustrations and examples of his own and in this way relates what he reads to what he already knows, there is no real learning or improvement.

The student's purpose in preparing an assignment also enables him to find the best ways of attaining his goal. If, for example, your purpose should be to get the author's thought completely and as rapidly as possible, you would naturally begin by scanning the chapter as a whole to ascertain what it was about; you would examine the sectional and paragraph headings in order to get a clearer idea of the exact problems or points treated; you would naturally check, underscore, or mark in your text the most important ideas stated by the author, and the key sentences bearing on each important problem or topic discussed. You would also list on the margin of your book or on a separate piece of paper the more important points made in the chapter. You would next make a logical outline or summary of these points stated in your own words. Reading for such a definite purpose would make you stop often to recall what you had read that bears on the problems discussed. It would make you stop at times to ask what the essential ideas really are, and keep you looking for the more important ideas which the author presents on the particular topics that are being discussed. It also favors concentration and helps to fix these ideas in mind for more ready and accurate recall,¹ making it easy to relate them to the larger wholes. It also develops the habit of reading rapidly as well as effectively, because the reader will mentally omit or slide over all unimportant phrases and sentences in his eagerness to find and fix the essential ideas brought out in the text.

¹ Compare on this point Chapter XIX.

(5) *First Read the Assignment as a Whole, then Go Back to the Difficult and Important Points*

Much time may also be gained in the preparation of an assignment if it is first studied as a whole. Knowledge does not exist as separate units of thought. The facts obtained in your reading or study are definitely related to each other. You should, therefore, not attempt to store them in your mind one at a time. The author's meaning will be more easily and accurately understood if you look for the important problems that are being discussed and the more important ideas brought out about each one of these topics. This aids in getting the thought. Moreover, if the relationship between the facts presented is clear when they are studied, they will be more easily remembered because each idea helps you to remember the other facts that are related to it. They are more easily remembered because each thought has been properly related to other thoughts that are already definitely fixed in the mind. Such relationships cannot be clearly seen unless the assignment is studied as a whole.

Furthermore, unless the assignment is first read as a whole, each sentence and division of the chapter is likely to be given equal value, and the key sentences, which often have the thought of a whole paragraph packed into one statement, will not be noticed or given due consideration. Many sentences merely introduce a thought; others only point to the key sentences which contain the important thought of the paragraph. Some sentences merely repeat in other words a thought that has already been expressed. If you first read the chapter as a whole, these inequalities can more readily be seen, and the mind hurries over the unimportant sentences and dwells on those that really express the author's thought. Furthermore, when the assignment has been read in this way, the second reading becomes very effective, because the student knows what it is about and has in mind the main points

brought out by the author. This meaning then lights up each section and sentence as you read, which makes it possible to interpret each part in the light of the whole and enables you to give it due emphasis. In other words, you are able to read between the lines, reflecting as you read on the causal relationships that are brought out in the text, all of which adds to your interest and pleasure in the work because it has a definite meaning for you. It also enables you to fix it more definitely in mind for ready recall and effective use.

The method is valuable in preparing your assignments in every subject. In translating a foreign language your first step, after recalling the content of the previous lesson, should be to endeavor to get the drift of the author's thought by reading the whole assignment at sight. After you have ascertained what it is about, you may go back and look up the new words and the troublesome constructions. In the light of the whole thought the special meanings of these new words can be more quickly and accurately obtained. Since many words have several meanings, you would lose much time in selecting the right one if you did not know the one that was needed. In fact you will have to feel your way more or less blindly throughout the entire passage unless you determine in some such way as is here suggested the general drift of the author's thought.

The principle is still more effective in preparing an assignment in history or mathematics. The work in history should be studied by the topical or project method, even if some topics are too long for a day's lesson. By reading ahead and by centering your thought on a particular topic or movement each fact and series of events comes to have a definite meaning, which can be much more easily understood and remembered because you got it with the other facts or events to which it logically belongs and associate it with them. If the work in history or literature is read part at a time instead of studied as a whole, the relation of one of the parts studied to the other points is likely not to be seen or worked out. Of course

the reading is less interesting because the student loses the connection and has difficulty in seeing its real significance and meaning. Under such circumstances he is likely to fall back on rote memory to fix the facts in mind, a process that will prevent him from ever using this information, because it is learned in a different way from that in which it will be used.

In mathematics it is well first to look over the entire assignment to locate the things you already know and the problems that are easiest for you to solve. These should be solved first because this gives you encouragement and help for solving the more difficult ones. In fact the power and insight you gain by solving the easier problems may be sufficient to enable you to solve those which you could not solve at first. It would indeed be foolish to spend all the time set aside for preparing an assignment in trying to solve one or two very difficult problems encountered in the first part of the lesson, when a number of problems farther on in the assignment could have been easily solved. Moreover, your failure on these difficult problems might paralyze your effort to such an extent that even the easier problems could not be solved after this failure. Such a procedure on a final examination would, of course, mean utter failure. The principle which works so well in an examination should be utilized in your study.

The law also applies to other subjects as well as to those we have already discussed. In science the data collected in your reading or experiments are all related to certain big general laws, and many of these laws are interrelated. Reading ahead to get a bird's-eye view of these laws and what is coming will throw a flood of light on the details that are being worked with on a particular day. This will help you to understand and to organize your data in a way that will make them interesting and personally significant because you have related them to what you already know and to the other facts and laws to which they belong.

In the preparation of the assignments in all subjects it is,

therefore, well to read ahead to get an idea of what is coming or what the whole thing is about before you work on the details. This will not only yield rich returns in the way of added interest and insight into the meaning of what is being worked at; it also favors the retention and correct organization of the materials that are being learned, preparatory to fixing them in mind for more ready and effective use.

(6) Carefully Plan your Procedure for Each Assignment

In preparing his assignments a student should always work according to a definitely formulated schedule or plan. No more time should be consumed in preparing the assignment than is needed. This means that a definite time should be set for beginning and for completing the work and that it should be attacked with the idea in mind that it must be prepared in that length of time. To facilitate the solution of the problem of making such a schedule for your work it would be well to look ahead to see how long the assignment is and how much time you should devote to its preparation. Then figure how much time may be given to mastering each page or important division of the chapter, noting as you finish each whether or not you are doing it on time.

Working by the watch or against time in this way favors the concentration of your attention on the work, the origination of more economical methods of work, makes it easier to select and organize the more important ideas found in the text, and in other ways makes for efficiency in reading such an assignment in your text. In fact, nothing adds more to one's interest in his work than the knowledge that each needed thing is being done successfully and on time.

(7) Keep a Record of your Progress

This calls attention to the importance of keeping an accurate record of the progress you are making in your work. The more clearly you see what must be done to master such

an assignment, and the more accurately and consistently you check up on the progress you are making in each of these sources of improvement, the more rapid and continuous will be your improvement in this type of learning. It would therefore be well to repeat at certain intervals Experiment VIII, and to try the following test each day, or on every third day, until you have learned how to read your assignments in the most economical way.

After the assignment has been prepared in the way indicated above, you should test your reading efficiency by keeping an accurate record of how well you can answer all the questions asked on it in class the next day. Consider all the questions asked as worth 100 per cent if answered correctly. Then determine your own efficiency by giving yourself the proper score for that day's work. In golf the player measures his efficiency and improvement by a bogey, which represents the best or average score for a particular hole or for the entire course. Consider your score on each day as such a bogey to be beaten if possible on the following day; keep a continuous record in the form of a curve which pictures the actual improvement that you are making from day to day in preparing your assignments, and continue the experiment until a perfect score has been made for a week. This, however, should be done for only one subject at a time. As soon as the assignments in that subject can be well prepared in the time allowed you may begin to measure your efficiency in preparing your assignments in another subject.

3. LEARNING TO READ RAPIDLY

(1) *Need for More Rapid Reading*

In much of our reading and work as students certain things must be so thoroughly learned that they will never be forgotten, as we shall point out in Chapter XIX. Where things are to be thus permanently fixed in mind, it is, of course, best

to study them in a way that will definitely fix them as soon as we meet them. The actual cost in time and energy spent in learning a Latin word, for example, or an important date in history or principle in psychology, when it first appears in your assignments, is but a small fraction of the time and energy that would be required to learn it incidentally by thumbing through a dictionary or by referring to your text each time that this word or principle is needed in your work. If such a word or principle is thoroughly learned when it is first encountered in your work, it will save many hours of work later on.

But in much of the reading and studying which students are required to do they have an entirely different purpose in mind from learning permanently all that the author has to say on the several topics discussed. It often happens in history and in psychology that in a given assignment a matter is referred to which the student remembers he has already met in his previous reading and now needs to know. It is therefore necessary to freshen up his mind concerning such a point in order to be able to understand what is being read now. In looking up such a point it may be necessary to examine hurriedly a hundred or more pages of text to find the point in question. Even in preparing a lesson in algebra or physics a student may be halted in his work until he can find in what he has previously read the principle which he needs, but which for the moment has slipped from his memory.

Moreover, every earnest student will be asking questions about the points discussed in his text, questions that cannot be answered without reading other references. This calls for a rapid reading of other texts in order to get additional information on these points. In fact, most of a student's work consists of making such an investigation of particular topics or problems, as we shall point out in the next chapter. This makes it necessary to learn how to read *rapidly* and how to examine an author to ascertain what he has to contribute on the

particular topic that is being studied at the time. How information may be obtained in the most rapid and effective way, properly organized, and related to what the student already knows, represents one of the most important achievements in learning to read effectively. And the illustrations that we have already given show why it is necessary for every student to learn to read rapidly as well as to ascertain and evaluate *all* that an author has to say on the topics that are being studied at the time.

(2) Improvement in Rapid Reading Possible

Experiments have shown that with a moderate amount of practice speed in reading may be increased from 50 to 100 per cent, if one's attention is directed sharply enough toward this particular point. It has also been found that forcing oneself to read more rapidly does not necessarily decrease one's power of comprehension. In fact, rapid reading naturally results in greater concentration of attention on the work; this makes the comprehension of what is read greater than when one reads it at a slower pace. In rapid reading one is forced not only to attend more closely to the work taken as a whole but to look for the more important sentences and words. This soon enables one to comprehend better what he reads than could be done if he read more slowly. It has been shown that increasing one's rate of reading is regularly accompanied by increased ability to get the thought. You should, therefore, force yourself to learn to read as rapidly as possible.

(3) How Improvement in Rapid Reading may be Made

It has been found that most college and high-school students read only about as fast as they can pronounce the words orally, and that they read more slowly even than they did when they were in the elementary grades. It is also well known that rapid reading is required to succeed with our work and that

all college and high-school students could very easily improve their rate of reading from 50 to 100 per cent.

In order to bring about this type of improvement a student must first of all really want to improve in his rate of reading. He must feel that it is valuable or necessary for him to do so, then direct his efforts and attention sharply to speeding up this particular phase of his work.

To do this it is best to practice with materials where the context is well known and where the topics discussed are clearly set forth in the paragraph and sectional headings. This makes it easy to hold these topics in mind as you read. To read rapidly and by sight as contrasted with the verbal method of reading you must learn to fill in the thought from two or three salient words in each line or sentence. Without taking a second glance you must press on, trusting that later sentences in the paragraph will clear up the meanings that you do not instantly catch. In general, it is helpful to notice the first and last words of the key sentences. But you must also look for the key sentences in each paragraph and for the most important paragraphs in each section or chapter.

If you merely want to follow the author's argument from the beginning to the end of the chapter, you should read by paragraphs rather than by sentences. The subject of a paragraph is usually contained in the first sentence or two. The other sentences merely explain this topic or thought sentence. The last sentence of the paragraph is important because it usually contains a summary of the thought explained in the paragraph. To get a correct idea of what your author is discussing you should therefore glance at the first short sentence or two in each paragraph. If this is sufficient, you may skip the rest of the paragraph and go to the next. If the first few sentences do not develop enough of the thought to carry you on, glance at the last sentence. At times, of course, you should pause to develop the thought further by reading the intervening sentences.

If you want to see what the book as a whole has to contribute to the particular problem that you are investigating, you will be able to do it quickly and rather accurately by noting carefully the subject of each chapter and section and by reading the first paragraph or two and the last paragraph in each chapter. The sections that discuss the particular topics in which you are interested should of course be marked and read more in detail, and particular attention should be given to the key sentences in the paragraphs dealing with those topics. By the use of this method G. Stanley Hall could examine two wheelbarrowfuls of books in one afternoon and night and get from them all the new facts they contained on the subject on which he was lecturing at eleven o'clock the next day.

The secret of learning to read *rapidly* is, therefore, the learner's desire or deeply felt need for greater efficiency in this direction, learning to slide over unimportant words or sentences, emphasizing the key words in a sentence and the important sentences in each paragraph, but never giving them so much time that they can or will be inwardly pronounced. These sentences usually contain the topic discussed, while the last sentence or two in the paragraph sums up what has been said or concluded on this point. This process is generally repeated in the chapter or other larger units of the text: the subject of such a chapter or division of the book is usually named and developed in the first few paragraphs, while the last paragraphs in the division contain a brief summary of what has been said earlier on this topic. The index, table of contents, and preface of every book studied should of course be consulted at the start to determine what it is about and to see how the various problems discussed are treated by the author.

In getting the thought from a text a student must do the same sort of thing that a pianist does in playing a score of music from sight. He must learn to neglect all the easy and well-known points, all the words that can be readily filled in

by the mind when the key words are noted and recognized. Like the musician, the reader guesses at these connections and fills them in correctly because of the higher language habits that he has already acquired. This is possible because the reader is attending to the essential thoughts or sentences which carry him along. Learning to read rapidly and yet effectively consists, therefore, mainly in being able to select these important sentences and words and to neglect the unimportant ones which the reader fills in mentally from the dominant sentences and words that he clearly apprehends.

One of the best aids to the acquisition of this kind of skill is to make it a practice to see how many pages of a given text you can read correctly in five minutes, checking up on the efficiency of your reading after each trial by writing down immediately after the reading what you have read during the test. By keeping an accurate record of the amount and accuracy of what you are able to read in such a test you will finally force yourself to read both more rapidly and effectively and so increase your skill until your physiological and mental limit for this type of work has been reached.

EXERCISES AND QUESTIONS ON THE TEXT

1. Name and briefly explain the five types of work which every student and many other workers are required to do each day.

2. What special conditions besides your method of work should you try to standardize or make as favorable as possible? (Compare section 2, (1) and (2).)

3. What other aids for learning to read most effectively are mentioned in the text?

4. Why is it important to determine your chief purpose in preparing the assignment before you begin to work?

5. Why is it helpful or necessary to keep this purpose ever before you while you work?

6. How should you actually proceed in preparing your assignments? Why? Does this method apply to the study of such subjects as mathematics, foreign language, and science? Illustrate.

7. How may the principle of planning be applied to the performance of this type of work? the principle of measurement or keeping a complete objective record of your progress?

8. Explain the need and possibility for more rapid reading. What is the relation between speed and comprehension in reading?

9. How must one proceed to learn to read more rapidly? How much improvement in this direction can the average student make?

10. What are some of the more important aids to the acquisition of skill in rapid reading?

REFERENCES

- McMURRY, F. M. *How to Study, and Teaching How to Study*, chap. iii. Houghton Mifflin Company, Boston, 1909.
- PILLSBURY, W. B. *Education as a Psychologist Sees it*, chap. x. The Macmillan Company, New York, 1925.
- SANDWICK, RICHARD L. *How to Study and What to Study*, chap. ix. D. C. Heath & Co., New York, 1915.
- STARCH, DANIEL. *Educational Psychology*, chap. xvi, especially pp. 294-296. The Macmillan Company, New York, 1916.

CHAPTER XVIII

HOW TO MAKE AN INVESTIGATION OR CRITICAL STUDY OF A PARTICULAR TOPIC OR SUBJECT

In the discussion of rapid reading attention was called to a type of study which constitutes without doubt the greatest bulk of the work that a high-school or college student is required to do; namely, to make a critical study of a particular topic or subject by ascertaining from reference helps, reports of experiments, textbooks, lecture notes, and the like all that is known on a particular subject, evaluating and understanding it, and bringing it together in the form of a final report which summarizes in a logical way the results of one's study of that subject.

1. THE PROBLEM STATED

In the performance of such a task three things must be done: (1) The student must ascertain where and how the desired information may be obtained, and he should be able to judge the relative value of the various source materials consulted. (2) He must collect the needed information from all these sources, decide what things bear on the problem studied, and judge accurately the relative worth of the facts so obtained. (3) He must assemble these facts in the form of a report which will present in a clear and logical way the results obtained from his study of that subject. This means that he must interpret and organize all the information secured or thoroughly digest what he has learned about the subject investigated.

2. HOW TO BEGIN

To do this sort of work in the most economical way a student must begin by getting clearly in mind the exact problem to be studied. This should be formulated by the student himself in consultation with his instructor and definitely limited, so that he may know exactly what he has to do. Unless this problem is definitely stated and limited in scope, the student will be unable to select accurately the facts that bear on his problem. Unless the problem is formulated by the student himself, he will not understand it; for we never really understand anything until we have formulated it for ourselves. This problem or purpose is also the key to the selection of the references needed to make the investigation.

3. LOCATING THE NEEDED INFORMATION

The student should begin by obtaining advice from a competent instructor in regard to where the best and most reliable material may be found on the subject to be investigated. When these materials are consulted, a definite record should be kept of the exact source of the information obtained, the author's name, the title of the book or article where the information was found, the date of the article or study, pages consulted, etc. These items should be recorded for each authority consulted just as is done on a standard library card in the card index. It is advisable to get as complete a list of reliable references or sources of information as possible before you begin to read. The most economical way of keeping a record of these source materials is to make a memorandum of each one on a separate slip of paper or card with the items arranged on its face just as they are placed on a standard library card.

As you consult or read the authorities that have discussed your subject, keep an accurate and complete record on a separate card for each additional author or book referred to

in the references you read, and continue the process until all reliable authorities treating your subject have been found and consulted; or, if such an exhaustive study cannot be made, until the time which can be devoted to the investigation of this subject has been exhausted. This bibliography, which should be arranged alphabetically to facilitate more ready reference in your study, should be added at the end of your final report. To save time and energy the library shelf mark should be included on each card so that this reference will have to be looked up in the card catalogue but once. It is also important that each item needed to locate definitely the book or article should always be listed on your cards and in the correct order.

4. COLLECTING AND EVALUATING THE DATA

When you are ready to collect and to study the information thus located, your problem or purpose in making the study plays a still more important part, for it must guide you in deciding which authors and which sections of the reports you consult make a direct and valuable contribution to your problem and which ones should be eliminated in your first hurried reading of the materials collected. This purpose will also guide you in judging the relative worth of the various facts that are being obtained from your reading and study. Your first problem in consulting a reference should therefore be to see whether or not it makes any contribution to the subject you are studying.

In order to determine this in the most economical way each article consulted should first be read rapidly and as a whole, as was explained in the preceding chapter. When this rapid survey has been made, it is advisable to record on the back of the card for this reference the general nature of the contribution which this author makes to the solution of your problem, such as "good," "no good," "method defective,"

"merits very careful study," "valuable on the following points," etc. Under certain conditions it may be well to get such an overview for all the available material in the field before any intense work on a particular reference is begun. This is advisable when one's time is limited or when it is necessary to get the greatest amount of help on a given subject in the shortest possible time. When a subject is to be worked out completely, it is more economical to get all the information contained in a given reference immediately after this first rapid survey has been made. Your problem in the second reading then becomes one of getting all that the author presents that is pertinent to your subject and of doing this in the shortest possible time, recording the facts in such a way that they may be readily used in constructing your report. But whether you collect your data as you go along or after a cursory survey of the entire field has been made, you should make some record of your findings and assemble them into a final report which represents the result of all your study and work on the subject. This finished report is your goal from the beginning.

It therefore becomes clear that the problem of evaluating the data collected in such a study, and the problem of assembling it into a final report, are greatly facilitated if the information collected is properly recorded and systematized as obtained, for the way in which this information is recorded either facilitates or retards the next step to be taken by the student; namely, digesting this material and working it up into a clear and logical report that presents the results of one's entire investigation of that subject. We shall, therefore, next proceed to show how the information obtained in one's reading may best be recorded and made ready for this critical study of the facts while writing the report.

5. BEST METHOD OF RECORDING THE DATA COLLECTED

Since this type of work gives practice in a method that must be employed in doing all scholarly and original work, regularly called research, we should describe in detail some of the best methods that have been used to record and file the information that is being obtained by such reading or in an experiment, preparatory to its final study and assembling into a finished report. There is, of course, no one best way for all persons to perform this task, one that holds for all kinds of investigations that a student may be called upon to make. The following suggestions represent some of the best devices that have been found to be generally useful for this phase of a student's work.

In the first place all the information, as collected, should be organized under suitable headings to which the facts bearing on that phase of the subject may be referred. These specific topics on which data are being collected should be clearly stated at the top of the page, and all material bearing on that topic or phase of the subject should be listed under that heading. For example, if you should desire to make a careful study of how to proceed to investigate the particular problem discussed in this chapter, "How to make an Investigation of a Particular Topic or Subject," you would have seven headings on as many different sheets of paper under which to record the information gathered; namely:

1. How to formulate the problem or subject to be investigated.
2. How to begin.
3. How and where to locate the information needed.
4. How to collect and evaluate the data.
5. Best way to arrange and record the facts obtained.
6. How this information should be assembled into a final report.
7. Writing the finished report.

All data and information collected on this subject should then be recorded under the appropriate topic or head as they are obtained. You should write on only one side of the paper, so that the material collected may be used without rewriting in constructing the first draft of your report. If more than one sheet of paper is required for the information gathered on a particular division of your subject, the sheets for this topic should be carefully numbered, fastened together with a clip, and filed in a manila folder or envelope so that your material may be systematically arranged as collected, and kept together for a critical study of all the facts you find, preparatory to their organization in the final report.

While the data available are being collected on these topic sheets, great care must be exercised to see that all sources of the information gathered are accurately and fully recorded in each case, including the name of the author, the title of the book or article consulted, the volume, date of publication, pages consulted, etc. This is *absolutely essential* for accurate and scholarly work and should be made habitual from the start. In every case credit must be given to the author whose ideas are being quoted or whose results are being used. This is necessary not merely because it is just to the author : it gives strength, dignity, and authority to your statements and to your report as a whole, which it otherwise would not have ; it also enables you at a future time, or anybody else who may use your work, to understand your work better by examining its relation to its sources wherever this may seem worth while. A convenient way of handling these references is to place them immediately after the points stated or at the end of the paragraph, thus : (W. F. Book, *Learning How to Study and Work*, 1926, chap. xviii, pp. 364-365). Cards instead of sheets of paper may, of course, be used for recording the facts you collect, and various devices may be employed to save time and energy in filing and organizing the material gathered together in the ways indicated above.

6. ASSEMBLING THE INFORMATION AND WRITING THE REPORT

When all your data have been gathered in the ways here indicated, the various topic sheets should be arranged for a thorough study of your findings. The material should be organized with regard to certain problems and arranged under certain logical heads, which may in part be taken from the topical headings under which you have recorded your data. At this stage a careful study should be made of all your facts and an outline prepared which will show not only the subjects that you intend to treat in your final report but also the best possible arrangement of these items in your finished report.

While this study of your data is being made, it should be remembered that the finished report is never a mere sum of the detailed points collected in your investigation but an outgrowth and an interpretation of all the facts you have assembled. That is to say, your final report should contain many separate and new ideas conceived by studying your data and by seeing the relationships which exist between the various facts that you have assembled. The formulation of these ideas and their deduction from the data collected constitute a most important part of your study of the subject. In fact, the materials collected should be organized around the more important ideas which this study of your facts has revealed.

In assembling the data or materials collected a student must therefore (1) decide what points he wishes to make in his finished report, then (2) list and assemble all the facts that bear on each of these points. If the central idea is clearly thought out and accurately formulated and if the facts bearing on this point are presented in their proper sequence, it will add greatly to the clearness and force of the report.

The materials that are being assembled may, of course, be organized from several points of view. But all the facts presented should be organized about some specific question or problem that is clearly indicated in the title of the report.

Different relationships for these facts may, however, be emphasized in the finished report. (1) The writer may give a logical presentation of *all* the facts bearing on the subject investigated. (2) He may present the data in a way that will show their bearing on some important scientific question that he seeks to answer or wishes to investigate. Lastly, (3) the writer may wish to emphasize the psychological or pedagogical implications of the data collected. If so, he should organize his facts in a way that will bring out in a clear and forceful manner how the data collected are related to this human or educational problem. And while the organization of the materials collected in such a study is largely an individual matter, determined by the student's purpose and interest, it should be remembered that the true basis for the organization of the data lies not merely in the relation which these facts bear to one another but in their relation to some fundamental human interest that gives them greater practical significance for the student and for others who may read the report.

It therefore becomes clear that in the collection, organization, and assembling of his data a student should form the habit of often asking himself, "What really is my purpose or point in making this study?" This question should regularly be followed by two others, namely: "What facts have I collected in my experiment or reading that support or contradict this hypothesis?" "Have I massed the facts in such a way as will bring out most clearly their true significance?"

In collecting and assembling their data students regularly encounter three types of difficulties that must be overcome or avoided :

1. They are, as a rule, not careful enough in their reading and observation to ascertain the facts. They make many misinterpretations of the statements they read. It is a common error for students to misread a question in an examination paper or a statement in a book.

2. Students also have difficulty in getting the central thought of the authors they read. The statements made by an author are never of equal importance. Neither are the facts collected in a scientific experiment. And what is more significant still, these statements must not be taken as isolated facts. McMurry says :

The field of thought, instead of being pictured as a plain, is to be conceived as a very irregular surface, with variations of various heights scattered over it. And just as hills and mountains rest upon and are approached by the lower land about them, so are the larger thoughts supported and approached by the details that relate to them.

A student should therefore divide the materials read and the facts collected into suitable units of attack : one larger thought together with its supporting ideas or details as one section of the subject, another larger thought together with its associated details as a second section, etc. This is difficult for most students to do because they do not keep clearly and constantly enough in mind what the author is trying to do or the exact problem that is being discussed at the time.

3. Many students have trouble in selecting the most important thoughts or phases of the subject when it comes to formulating the results of their own study of a particular subject. The real difficulty comes from not thinking it through and wording the principal idea accurately enough to avoid this type of mistake. The central thought expressed by an author should always be accurately and completely phrased by the student while or after he reads it. In writing his own report he should phrase beforehand exactly what he proposes to discuss. Many students are inaccurate in their interpretation of the authors they read and in digesting the data collected, because they fail to continue their thinking up to the point of wording for themselves just what their author has discussed or what they themselves wish to present in their report.

The best way to make sure that your report will be logical and clear and that it will state exactly what you intend is to decide these matters definitely; then you should construct an outline that will show just what you propose to present. This can easily be done after your materials have been thoroughly digested and organized in the ways indicated above. This not only makes it more likely that you will make the most important points in your final report; it will enable you to eliminate all duplications of material and all the points that are not pertinent to your purpose or subject.

This procedure is followed in preparing the *first draft* of the report, which should, of course, be written as well as possible. But it must be revised after it has been finished and laid aside long enough to enable the writer to read it somewhat like a stranger. This makes it possible for the student to edit and revise it himself. After such an interval of time the writer will approach the revision with more freshness and be able to improve his statements and the arrangement of the points to make his meaning more forceful and clear. He may even find it necessary to make certain corrections for the sake of clearness or accuracy, or to make important additions or eliminations. If extensive additions are to be made in the revision, the new material may be most conveniently added on separate sheets, which should be numbered like the sheets in the first draft of the report but should bear a letter after the page number, such as 10a, 10b, 10c, etc. Some writers make it a point never to fill the page in writing the first draft of their report. This enables them to make additions and corrections on each sheet of their copy as occasion demands.

7. MOST DESIRABLE FORM FOR THE FINISHED REPORT

The final writing of the report should not be undertaken until the student is satisfied that all necessary revisions have been made. When this has been done, the final draft should

be written or typed in clear, concise language. The space between paragraphs should be slightly wider than between lines.

The margin on the left side should be at least an inch wide, and any long quotations used should be further indented, or typed in single space, to indicate to the eye that this material is quoted. The sentences should not extend entirely to the bottom of the page.

Important words, and foreign words which cannot be said to have been adopted into English, should be underscored.

At the end of the report there should be a list of all the references used in making the study, arranged alphabetically. These should contain each item needed to locate quickly and accurately the exact source of your material. They should always be arranged in the same correct order.

When finished the pages of the written report should be fastened together with a clip and placed in a stiff manila folder or paper cover bearing the name of the writer, the subject of the report, and the date. This will keep the first page from becoming soiled or ragged and will make it possible to preserve and file all your work for future reference and use.

8. EFFICIENCY PRINCIPLES THAT APPLY IN DOING THIS SORT OF WORK

In addition to the standard procedure that has just been described for planning and doing this kind of work, and to our account of the aid derived from having a correct and definite purpose in mind, it should be pointed out in conclusion that most of the other principles of personal efficiency described in the earlier chapters of this book apply to the performance of such a task as we have here described. It is very valuable to plan your entire procedure not merely as to method but also as to time and the degree of completeness or care with which you propose to accomplish this task. It is important, also, to plan to work when you are physically fit and to make all

other conditions, mental as well as physical, as favorable as possible for this type of work. One of the most valuable aids that could possibly be employed is to make a careful and continual study of this particular type of work, with a view of finding the most economical way of performing it. The only way you can conveniently check up on the progress you are making in the performance of such a task as we have described in this chapter is to plan it carefully, then note as you go along how much of this plan you have been able to carry out by a particular time or date. In planning such a task it is very important to set a definite time when the work must be finished and to plan to have certain parts of it completed by a specified time. This greatly aids in keeping yourself constantly and effectively applied to your work, and therefore improves both your efficiency in its performance and the quality of your work. In fact, all the principles that were illustrated and discussed in Parts II and III of this book operate when a student applies himself to such a task as making a detailed study of some particular subject, and the individual who makes the best adjustment to these laws and who works in harmony with the principles already described will naturally obtain the best results.

EXERCISES AND QUESTIONS ON THE TEXT

1. What must a student do to make a scientific study of a particular subject or problem?
2. What is the first thing to be done, and why is it important to give special attention to this? (See section 2.)
3. How should you proceed to locate the most reliable information on this subject?
4. What is the most economical procedure to follow in collecting and evaluating the data or available facts on this topic?
5. How should the facts you obtained be recorded and made ready for your study of all data collected, preparatory to making a final report on your work?

6. What kind of study should be made of the facts which you have assembled? Why?

7. What determines the way in which these facts should be organized in your final report? (Compare section 6.)

8. What use should you make of your purpose in making the study when you assemble the data and write the final report?

9. What sorts of difficulties do students regularly encounter while preparing such a report upon their investigation of the particular topic chosen or assigned them?

10. In what form should the finished report be made?

11. What principles of personal efficiency apply most directly to the performance of this type of work?

CHAPTER XIX

HOW TO MEMORIZE OR FIX IN MIND THE NEW KNOWLEDGE AND FACTS TO BE LEARNED

1. THE MERE ACQUISITION OF KNOWLEDGE COMPARED WITH ITS ACQUISITION FOR EFFECTIVE USE

Much of a student's time in each subject studied in high school and college is devoted to acquiring information that must be organized and permanently fixed in mind for prompt recall and effective use. Many things that a student meets in his reading or that are presented in lecture form must in the foregoing way be fixed in mind for future use in the solution of the problems that he meets at school or in life.

Sometimes a student's chief business is to acquire knowledge by observation and reading or by listening to lectures. Certain matters are placed before him in books or by his teachers, and he is required to master them or to make them a part of his permanent stock of knowledge. Students must, therefore, learn to judge accurately and quickly what materials should be learned in this way and what things should be overlooked and forgotten. They should also learn how to acquire in the most economical way the things that should be made a part of their regular stock of knowledge. We shall try in the present chapter to show how this may best be done.

More often, however, a student must use the knowledge that he has already acquired in order to attain some desirable end or to solve a problem which has been assigned him by his instructor or to meet some difficulty which he encounters in his work. In the first case he is called upon merely to acquire new facts and to organize them for prompt

and accurate recall. In the latter instance he is required to *use* the knowledge and experience that he already possesses in solving new problems successfully or in attaining some desirable end. The discussion of how a student should proceed to learn to use his knowledge and experience more effectively in solving *new problems* or in attaining other desirable ends will be reserved for the next chapter.

(1) *General Relationship between the Acquisition of Knowledge and its Effective Use*

The general value of each of these types of mental activity will be made clearer if we point out the general relationship which exists between them. The mere acquisition of facts is the more primitive and simple process and must precede in a sense the use of the materials learned. It is clear that before one can apply a bit of knowledge or experience in solving his problems or in overcoming the difficulties that he meets in his play and work he must have acquired it. This would seem to indicate that the acquisition should take place *before* the second sort of learning mentioned above could begin, because better mental adaptation and a successful solution of one's problems require the application of the knowledge and experiences which have already been acquired, organized, and fixed for such effective use. In other words, the application of the knowledge and experience needed to solve problems is only made possible by the fact that the information needed has been acquired, retained, and made ready by suitable organization for such effective use.

But while the effective application of the knowledge one has acquired, through memorization or learning in its simplest sense, is the *real* goal of the learning process, it is possible to acquire knowledge in any field without being able to apply it effectively to the solution of one's problems or to use it in overcoming one's difficulties. That is to say, it is quite possible

to acquire and assemble facts in a way that will preclude their being used to any marked extent in solving problems or in overcoming the difficulties that one encounters in his play and work.

(2) *General Significance of This Relationship between the Mere Acquisition of Knowledge and its Effective Use*

The real significance of this relationship between the acquisition of facts and their use in solving new problems in school and in life lies in the fact that all knowledge should be acquired in such a way that it may be used in meeting the difficulties we encounter in our play and work. That is to say, things should be learned and organized for future *use*, never learned merely by rote. Most students fall far short in their study because they memorize the things to be learned without relating them properly to what they already know or without much thought of applying the facts they acquire to the solution of some of the actual problems which they meet in school or in life. While these two types of mental activity (the acquisition of knowledge and its application to the affairs of life) are very different and should be separately described, they should not be considered as independent phases of the learning process, because they aim at the same result; namely, the proper guidance of our conduct. The process of acquisition should always culminate in the application of the knowledge that is being acquired and should be carried on in a way that will facilitate to the greatest possible extent the real goal of the learning process; namely, the effective use in the control of our behavior in further learning or in research and work, of all the knowledge and experience that have been obtained through our contacts with the world. How new knowledge and experiences may be acquired so that they may be used in a successful manner when we are confronted by our tasks is the real problem to be considered in this chapter.

2. BEST METHOD OF ACQUIRING NEW KNOWLEDGE AND FACTS

The acquisition of knowledge involves, besides selecting and concentrating upon the thing to be learned (attention), (1) the impression or learning of the facts to be acquired; (2) their retention by the learner; (3) the ability to recall what has been learned; (4) recognizing the facts as familiar or old when they are reproduced for effective use in further learning or in our work. Improvement in one's method of acquiring new knowledge and facts must therefore provide for advancement in all these ways. There must, of course, be a proper selection of the things to be learned. Then by effective and continuous application these things must be impressed through the proper channel or sense departments so that they may make enough of a modification of one's organism to be retained. They must also be made ready for recall or effective use in future learning or work. Lastly, everything that is thus re-presented through the process of recall must be recognized and properly evaluated before it can be effectively used in the solution of new problems or in making the adjustments to our environment that we are continually required to make.

The key to the improvement of our memory lies, therefore, in the laws which determine our ability to recall what has already been learned. But proper methods of memorization require that a right relationship be established and maintained between the process of learning and the application, or use, of the facts that are learned. The more associative bonds that are made between the things that are being learned and the things that we already know, the better will these new facts be impressed and the more easily will they be recalled. Moreover, the way in which these linkages are established will determine the *particular use* that can be made of the information that has been acquired through the ordinary process of learning. It is this intimate relationship between the method

of impression, or learning in its narrowest sense, and the process of recalling and using what we have already learned that makes the development of a good and serviceable memory, such as all students are here urged to acquire, an essential factor in developing the power to think and reason effectively or to work in the most successful way at a given task. But to produce within the organism of the learner the modifications that make possible this sort of learning and the effective use of what has already been learned requires much repetition or drill. This should take place according to certain well-known laws that control the establishment of the particular habits to be formed. We shall, therefore, first try to present what students should do to acquire new facts in this most economical and effective way, then briefly describe some of the more important aids to the effective use of what has been learned.

(1) *The Problem of Economical Learning Illustrated and Explained*

If you wish to memorize anything in the most economical way, such as a poem, a formula, a list of dates, an argument, an outline, etc., you should see (1) that it is clearly understood; (2) that a need for it is felt; (3) that the material is repeated with the intention of fixing or remembering it; (4) that attention is sharply concentrated on this material; (5) that several senses are brought to bear on the material to be acquired; (6) that appeal is made to the favored sense department; (7) that first impressions are carefully made; (8) that the time devoted to the necessary repetitions is scientifically distributed; (9) that important material is impressed before going to sleep; (10) that new and extraneous materials and stimuli are not introduced immediately after this thing has been learned; (11) that the material is repeated at short and increasing intervals; (12) that more impressions are made than are needed for a first recall; (13) that the material to be

learned is attended to as a whole as well as in parts; (14) that the work is approached with the belief that it can and must be learned; (15) that the material is impressed by active recall; (16) that the material is impressed by first recalling what you already know; and lastly, (17) that you are well rested and in good physiological condition before you begin. The material to be learned should also be impressed in a way that will insure its effective use when needed later on in your work. That is to say, it should not only be integrated within itself but should be properly related to the knowledge that you already possess and learned in such a way as will insure both its ready recall and its effective use when you are confronted by a new difficulty or task.

We shall, therefore, first consider the factors which aid economical learning and mere recall, then attempt to explain how things must be learned so that the new knowledge may be effectively used in our play and work.

(2) *Special Aids to Economical Learning*

Understand material. There are many factors that favor the memorization of the things to be learned, as the list of favorable conditions enumerated above has already shown. In the first place, a clear understanding of what is to be permanently fixed in your mind facilitates its learning. The important rôle played by this factor may be seen if you compare the difficulty of learning a series of nonsense syllables, such as *pjk*, *tizok*, *mojip*, etc., with the comparative ease with which an equal number of syllables forming a paragraph of connected discourse can be learned.

Making it a point to understand what is to be learned and to be interested in it is far more important than any of the other facts about economical learning that psychological experimentation has given us. In committing things to memory it is, for example, better that a student should slowly

reconstruct a formula or principle that is to be permanently learned than to learn it by rote or in a way that would enable him to reproduce it verbatim. In the former case he relates it to what he already knows and learns it in a way that favors its ready and appropriate use in other connections. In the latter case it is fixed in mind without any of these valuable associations and can, therefore, be recalled only as learned, as in the case of the boy who regularly had to repeat the whole multiplication table for the sevens when he wanted to know the product of seven times eight.

This does not, of course, mean that everything must be completely understood before it is used. The use of a formula and the application of a principle lead to their correct understanding if the proper stress has been placed on understanding them, while their use helps to fix them permanently in mind and in a way that will favor their application later on. Understanding them makes it easier to fix in mind the facts to be learned because they are linked up with things that the student already knows, because the process of memorization has been carried on in a way that is interesting to the student, and because the thing that is being done has some meaning and significance for him. Learning material that is unappreciated or that has little significance for the learner constitutes a disagreeable task.

Feel a need for the things to be learned. Any kind of material can, therefore, be more easily and permanently learned if the student feels a genuine need for the information to be acquired. A student will, for example, learn the lines in the *Merchant of Venice* more easily and quickly if he is to take part in the play than if his instructor assigns its memorization merely as a task. It is, of course, not easy for a student to discover a real personal need for committing to memory all the things that should be permanently fixed in his mind, but by a little care and forethought almost everything that ought to be learned may be associated with some native

interest, which will not only make it easier to apply one's attention and energy to the work but will also make it possible to impress the things to be learned in a way that favors more ready recall and effective use.

Repeat material with the intention of remembering it. Such a need also helps to make the student repeat or read the material to be learned with the avowed intention of remembering it. This intention is strengthened by the fact that the information is to be used. It also greatly affects the fidelity of memory. If, at the time of impression, the student intends to retain the material studied only until the recitation the next day or until after the examination, it tends to slip out of mind. This is because it is not properly associated with other known facts and is only superficially impressed. If, however, you impress it with the avowed intention of retaining it permanently, it is retained better. If now in addition you clearly see some definite need for this set of facts, they will be still better retained because they are learned with the intention of using the information later on. This favors both the learning and the recall. When you study an assignment, you should, therefore, intend to retain the most important facts permanently; for this helps to insure both their permanence and their effective use.

Concentrate attention on material to be learned. It should also be pointed out that in impressing the things to be learned ten minutes of study with attention sharply focused on the things to be fixed in mind are worth more for such learning than an hour's repetition when the materials are not attended to intently. It is, therefore, worth much to a student to learn how to apply himself fully and consistently to his work, as we shall point out in Chapter XXI. A study of the meaning of what is being learned, dwelling upon its importance and significance, relating it to what you already know, noting the various aspects of the things to be learned, and making numerous applications of these facts, not only helps to keep your mind fully

focused on the details and on their permanent impression but also favors the most effective recall, as we shall presently see.

Appeal to more than one sense. Much depends also upon how the materials are presented. All learning starts with the impression made upon the sense organs by a stimulus. In adult learning most appeals are made to the ear and the eye. When one's experiences are recalled, they are, therefore, usually re-presented in this same sensory garb. That is to say, when you recall experiences that you have had, they are reproduced in certain sensory terms called images, which take the same general form as the original perceptions, though they are likely to be less clear and detailed.

Most students will, therefore, find that it is a distinct aid to learning if several senses are used. Then *one* sense may come to the assistance of the other when recall is attempted, as is the case when we write a word to see what it looks like, when we are not sure of its spelling. This principle was made use of by Madame Montessori in teaching little children their letters. Instead of presenting these letters to sight alone, she showed them in sandpaper forms. These the children were required to trace with their fingers after or while they saw and pronounced them. This aided not only in learning the letters but also in their recall. It was found that the children were often unable to recognize a letter by sight alone, but could easily do so if it were traced with their fingers. In like manner students who find it difficult to recall the substance of a lecture may find it helpful to say some of the lecturer's sentences over to themselves or to see in the mind's eye the headings and chief points which the lecturer made. In this way everything is not left to hearing. If the student writes these things down, the points are doubly impressed and will be much more likely to be recalled than if they are merely visualized or followed mentally while the lecture is given.

Make most appeals to your favored sense. Something may also be said in favor of making your appeals in learning to the

particular sense department that you use most in recall. Many students will find it profitable to determine their prevailing memory type. If you find that you have greater difficulty in remembering material impressed through the ear than through the eye, reduce things to visual terms as much as possible. Make your lecture notes more complete or tabulate things that you wish to remember, thus securing impressions from the written form. If, on the contrary, you remember best the things that you hear, you may find it a good plan to read your lessons aloud. This not only favors a particular type of imagery but makes an appeal to an additional sense which aids in fixing in mind the things that you seek to learn. Many students, upon the discovery of such a preference, have increased very materially their memory ability.

Guard first impressions carefully. And since all learning depends upon the impressions that are made by stimuli that come through the senses, much will depend upon how and when these impressions are made. In the first place, special care should be given to first impressions because these always produce a greater effect than the later ones. Students should see that the materials are properly observed or correctly read in the first place and accurately understood. Much of the inaccurate learning and of the poor memory that teachers complain of is due to the fact that first impressions are not carefully made. Students get in the habit of giving the things to be learned only a hasty glance and so do not note them accurately, thereby failing to start the desirable habit with the momentum that is required to fix it most economically.

Distribute scientifically the time devoted to repetitions. First impressions are, however, not enough. There must, in general, be many repetitions of what is to be learned. It is a well-known fact that material which is repeated several times is remembered better than that which is impressed but once. As was pointed out in Chapter IX, one impression produces a given tendency to recall, because a pathway has been made

in the brain. Three or four repetitions will therefore produce a greater tendency to recall, because this pathway is deepened every time the nervous current passes over it. Much also depends upon how these repetitions are distributed. Suppose that only one hour can be devoted to learning a poem securely, and suppose that it can just be repeated without error after fifteen minutes' practice. There remain forty-five minutes in which to deepen the impression by further repetition so that the poem will be known not barely but confidently. In such a case it is the poorest economy to use the remaining time at once. It would be far better to postpone further practice until the next day and to use the time in short practices on successive days, stopping on each occasion shortly after the poem has been brought up to the point where it can just be said.

One reason for the superiority of this method over the one in which the entire hour is used for study is that one gains a knowledge each day of which parts of the poem are most likely to be forgotten, and so can direct special attention, in the repetition, to these more difficult parts, not so much by special repetition of these parts as by giving closer attention to them.

Another reason for the superiority of this method is suggested by the curve of forgetting, which pictures the rate at which one tends to forget what has been learned. Forgetting proceeds according to a law, the curve descending rapidly at first, then more slowly. That is to say, a large proportion of the material learned at any particular time is forgotten the first day. After this a constantly decreasing amount is forgotten on each succeeding day for about a week, after which the amount retained remains practically stationary. This seems to suggest that the early repetitions should be closer together than the later ones. As long as you are forgetting rapidly, you will need more repetitions to counteract the forgetting than later on when the forgetting proceeds at a slower pace. If, for example, it should take twenty repetitions to learn a poem, it would be better to make five repetitions,

then rest; in an hour make five more; and within the next twenty-four hours, five more. This would probably be sufficient with such a distribution of your practices to learn the poem by rote, and you would still have five repetitions that could be used for keeping the poem fresh in mind by a repetition on each succeeding day for the next five days or on every other day for the next ten days.

Impress important material before going to sleep. Still a third reason why a time interval should be allowed between periods of intense practice is to be found in the after-effects that are produced by the stimuli that we employ in the learning. After a certain amount of stimulation has taken place, the organic changes set up in the organism by the practice seem to continue after the stimulus ceases to be applied, provided, of course, that other conflicting stimuli are not injected into the situation in the meantime to interfere with this perseveration effect. As William James phrased it, "We learn to swim in the winter and skate in the summer." Just what takes place in the organism during such intervals of time between practices is not known. Processes of nutrition are continually occurring. The blood brings in particles to repair the nerve cells that have been partly used up in the drill, rebuilding them according to the pattern left by the impressions made in the preceding practice. This after-effect of stimulation suggests, as the author has elsewhere pointed out,¹ that periods of strenuous practice in learning should be regularly followed by short periods of rest, during which these nutritional processes would have time to "set" the impressions made by the preceding practice. It would also be economical to impress, just before one goes to sleep, the important things to be learned because it would give them a better chance to get "set" in this way than when the things are impressed at other times, since it is during sleep that the reparative processes are most active.

¹ W. F. Book, *The Psychology of Skill*, pp. 105-114, especially the note on page 109. The Gregg Publishing Company, New York, 1925.

Avoid conflicting stimuli. This perseveration effect further suggests that it is important, in learning, to refrain from introducing other materials or stimuli into the mind immediately after you have impressed what is to be learned, because this would interfere with the fixing effect that is produced by the impressions that have been made in the practice. After you have impressed by continuous repetition the things to be learned, do not turn immediately to something else, but let the brain rest for three or four minutes or until the impressions to be fixed have had a chance to get "set."

Repeat material at short and increasing intervals. Probably another reason for the value of the spaced practices is that each repetition of a given material made at one sitting occurs with less interest and attention, and in consequence with weakened effect upon the mind. But after an interval of time the effect of a repetition will again be heightened. *Fatigue* and *ennui* are both fatal to learning. To avoid these in your memory work, have frequent short sittings rather than a single long one, and repeat at increasing intervals, as was suggested above. Since every subject and assignment has some principles of such prime importance that they should be securely fixed in mind by definite drill, they should be repeated at short and increasing intervals so that their retention will be more enduring and sure.

Make more repetitions than are needed for immediate recall. In learning it is also best to make more impressions than are needed to insure recall. Such overlearning is valuable because things drop out of mind very rapidly after they have been learned. If, therefore, you wish to recall at a later date the facts that you are acquiring, they must be learned far beyond the point of immediate reproduction. It is a well-known fact that things learned a long time before they are to be recalled fade out of mind. Moreover, the conditions may not be as favorable when you need to recall and use them as they were when you acquired them. You may be hurried, distracted, or

otherwise engaged. Unless the facts that you need are very firmly fixed, they cannot under such circumstances be recalled; or if they are, their recall will be so difficult and slow that it detracts from your regular work. For this and other reasons all important facts should be so well learned that such distractions will not be detrimental to your work.

Attend to material as a whole as well as in parts. It is also important that the material to be learned should be read and attended to as a whole. The experimental work on memory that is best known and that has been most often repeated shows that it is from 10 to 30 per cent better to learn such things as a poem by saying the whole poem through from beginning to end over and over rather than to learn it a stanza or a few lines at a time. If the poem is very long, it should be broken up into convenient units but at a natural division in the thought so that it will not be difficult to connect the different parts that would in this way be separately learned.

The chief value in the "whole" as contrasted with the "part" method of memorizing is the fact that in the "whole" method the material is learned as it must be reproduced, and no extra associations need to be formed between one stanza and the next. The "part" method of learning, on the other hand, not only requires extra work but causes several pitfalls to be established for the learner because of the extra linkages that must be formed between the parts that were separately learned. These are never so thoroughly fixed as the parts that were learned separately. Of course, with the "part" method the learner can easily see how rapidly he is progressing. This is an advantage because it serves as a stimulus for the learner to apply himself more fully and continuously to his task, whereas if the poem is learned as a whole he may have some difficulty in keeping himself fully applied to his task, because he cannot tell how rapidly he is progressing and so is apt to lose confidence in his ability to succeed. This confidence in

one's ability to succeed and the knowledge that actual progress is being made are great incentives to success in all types of learning. It is, of course, important to fix the more difficult parts in mind by extra scrutiny or even by extra repetitions as they are located by the attempted recalls that should be made a regular part of the learner's program, as we shall explain in the next section.

Have confidence in your ability to reproduce and use what you have learned. In an earlier paragraph we emphasized the fact that a need must be felt for the material to be learned if it is to be acquired in the most economical way, but it is just as important that the learner approach the task of memorizing his materials with the feeling that he *can* and *must* learn them. Students sometimes acquire the unfortunate habit of believing that they have bad memories, a belief that is usually unjustified. The effect which such an attitude will produce on the ability to learn has already been shown in Chapter XVI. It is true that individuals differ somewhat in their native capacity for retaining the impressions made by stimuli in learning, and that their native capacity to retain what has been learned cannot be improved except by rest, sleep, better health, etc. But a good memory really depends upon the power to *recall*, and this may be directly improved by the way the things are impressed or learned. To make the learning go on in the most economical way, certain conditions are required, as we have already pointed out. When these conditions are arranged, your memory is good. Providing such conditions therefore constitutes what may be done to improve your memory. After these conditions have been provided, you should trust nature for the results. An attitude of confidence in the fidelity of your memory and in your ability to learn and recall is an essential condition for learning and for the effective use of what has been learned. If, when you are memorizing, you continually tremble for fear that you will not be able to recall at the desired moment what is being impressed, the process of learning will

be greatly interfered with. You should therefore utilize all your knowledge about the most favorable conditions for memorizing and apply it as far as you can, then rest content and let nature do the rest.

(3) *Factors that aid in the Effective Use of what has been Learned*

Thus far in our discussion we have emphasized a group of factors that favor the mere fixing of the information to be acquired. We should next point out that facts can be recalled only as they are learned, and emphasize the importance of fixing everything that is to be learned permanently in a way that will insure its ready and appropriate *use* in solving the many new problems and in meeting the difficulties that we encounter in our play and work.

Impress material by active recall. The first important aid to this end is to impress by active recall what is to be learned. Reproduction is the goal of all learning, and all the devices for improving our memory so far discussed are only means to more effective recall. But in addition to the conditions already discussed which favor the impression of the materials to be learned in a way that will facilitate their prompt and accurate recall, it is helpful to learn new facts by *rehearsing* them under conditions *similar* to those under which they are to be recalled. When repeating a poem in order to memorize it, it is desirable, for example, to try as soon as possible to look away from the book and to imagine yourself standing before the audience that is to hear you recite it. This active effort to recall the lines is more effective than merely repeating the lines passively. And in recalling them the next day it is better to try to reconstruct the lines before looking at the book. A little patience often leads to the restoration of the missing words or phrases, and if they are recalled in this way they are much more firmly established than would be the case if they were revived by glancing

at the text. It is astonishing how much of what has been previously learned will come to mind in the course of an hour if it is reverted to again and again in the interval between your tasks. The importance of practicing recall as a regular part of the learning process can hardly be overestimated. Some psychologists advise that more than half the time spent in memorizing significant material should be spent in trying to recall it.

Associate material learned with the knowledge you already possess. This helps to explain why some students learn so much better than others. They make it a practice to use odd moments in the day for recalling bits of knowledge that they already have learned. This favors not only its retention and recall but its appropriate use. When a bit of knowledge acquired in a certain classroom and in a given subject is recalled only under the exact circumstances under which it was impressed, it cannot be said to be available for use. But if it has been recalled in other connections and if it has been frequently revived against other backgrounds and properly related to the other facts to which it belongs, it gains an independent strength that favors its prompt recall in all circumstances where it may be used.

To be effective for use the materials learned should, therefore, not only be integrated within themselves but properly related to the knowledge that you already possess and intimately associated in your recall and thought with all other facts that belong in its class. That is to say, during the process of study a student should plan for brief periods of recall at which the materials he has read may be quickly reviewed. The purpose of this method is (1) to test the efficiency of your method of work, for where this is done you often stop in your reading to ask whether you are really getting the thought. (2) It helps you to make what you are studying available for future use by fixing it more securely in memory and by learning it in a way that will facilitate its effective use.

This method of recalling the important facts to be learned also favors greater concentration on your work. Many students in high school and college think they are studying when they are merely reading words. They come to class and find that the hour or two that have been spent in study have availed them nothing. They cannot recall literally what was read; neither can they discuss the author's thought, because they failed to get it when they read the assignment. But if they would make it a practice to note the important points made in the assignment, as was described in Chapter XVII, and would practice in their reading the recall of these important points, the facts to be learned would not only be more firmly fixed in mind but would be learned in a way that would insure their effective use.

3. RIGHT AND WRONG METHODS OF LEARNING COMPARED

This calls attention to the important difference between learning things by mere rote, like learning the alphabet or the names of the days of the week, and the more effective and economical method of establishing logical associations between the new facts to be acquired and what you already know. For example, when a student takes up the study of psychology for the first time, he might memorize a definition for the science in trying to determine what psychology really is or treats of. But a better way would be to start with an analysis of the word and recall that it is of Greek origin, a word whose first part, "psych," refers to the Greek goddess of mind or air and whose last part, "ology," means "science," making it mean the science of the mind or soul. He should also recall the fact that any individual or species that possesses the best mind is supreme and most successful in making appropriate adaptations to his environment. This would show that in psychology we really study the mind in its relation to conduct or the responses which all living creatures make. Its problems may

therefore be approached either from the objective or behavior side or from the more traditional and historical side, by beginning with an analysis of the mind itself, which in a sense controls all the responses that a living creature is able to make. This would not only give the student a better understanding of the definition to be learned but insure the retention and effective use of what he is learning.

This is true because the old facts to which the new information has been related are already firmly established in the mind. They, therefore, act as a sort of magnet around which the new materials are grouped and serve as a means for recalling the new facts when they can and should be used. If the new material is associated by making numerous comparisons with many other well-known facts, its chances for recall and appropriate use will be greatly increased. In fact, the more comparisons that are made and the more often that the new facts are related to what is already known, the more readily and effectively can the material be recalled and used when occasion demands its application in the solution of your problems in study or other work.

If, in the act of learning, the new material is related to what you already know and to everything that belongs in its class, and if these logical relationships are regularly reviewed, not only in the learning act but in your thinking, the knowledge which you acquire can be effectively used as occasion demands. But if it is learned by rote, merely memorized, it will rarely be used, because it can be recalled only as it was learned. And since it was not learned in a way that would facilitate or even permit its direct linkage with other things than those with which it was directly associated while it was being learned, it cannot be effectively applied. It is well to remember that facts can be recalled only as they were learned, which means that if they are to be effectively used they must be learned as here indicated.

4. EFFICIENCY PRINCIPLES OPERATIVE IN THE MEMORIZATION OF NEW KNOWLEDGE AND FACTS

We have seen the extent to which the learner's purpose or aim controls the process of learning. In acquiring and fixing new facts much depends upon the purpose which the learner has in mind while this material is repeated. If his aim is to prepare for an examination or merely to answer questions in class the next day, little permanent value will be obtained from his study. If, on the other hand, his intention is to learn these facts permanently and in a way which will facilitate their retention and effective use, the associations to be formed will be established in a way that will favor both their retention and effective recall or use. The procedure in all study involving any type of memory work should, therefore, be definitely planned and the correct procedure promptly and consistently carried out. This insures better methods of learning, better organization of the materials learned, and as a result more prompt and effective recall, which is the true goal of the learning process.

Keeping a record of your progress in learning and of your ability to recall and use what you have learned will create an interest in this type of improvement and aid you in finding better methods of doing this type of work, tending to make you genuinely interested in your own advancement in this direction. Nothing could be more helpful than making a definite plan for improving your method of memorizing new knowledge and facts. You might even keep a written record of the things which you find by practice and experience to have helped you in this type of work, and so use the principle of preparing written practice instructions for this type of work. It will, in fact, be seen that all the principles described in Parts II and III of this book apply in a very direct way to such a problem as improving your ability to acquire new knowledge or facts in school or in after life.

5. NORMAL RESULTS OF ACQUIRING THE MOST FAVORABLE METHODS OF LEARNING NEW FACTS

As has already been shown, the only way to aid retention and effective recall is to improve your methods of learning or the conditions under which the materials to be learned are impressed, and to note the familiarity of the things recalled and the logical relationships that they bear to other facts that have already been learned. Memory is not a mysterious mental faculty with which some persons are endowed and others not. All persons with normal endowments can improve their ability to learn, in the ways that have already been described. And when these powers of memory are improved in the ways indicated above, it means that important improvements are made in other mental functions as well. Improving your ability to remember improves at the same time your power to concentrate your attention on your work, your power to image, to associate facts, and to reason. This is true because facts are imaged when they are recalled (represented). Improving your memory, especially for the purpose of aiding recall, teaches you properly to relate and associate the new facts that are being learned with what you already know. The latter is a necessary preliminary step to reasoning or using your knowledge and experience in solving new problems encountered in your play and work. We should, therefore, next inquire how a student must proceed to learn how to reason in the most effective way when confronted by a new difficulty or task.

EXERCISES AND QUESTIONS ON THE TEXT

1. What is the difference between the mere memorization of facts and their acquisition for effective and continued use?
2. What relationship should exist between the process of acquiring new knowledge and facts and their effective use?
3. Enumerate and briefly explain the four steps involved in the acquisition of new knowledge and facts.

4. What is the real key to economical learning or to the improvement of one's memory?

5. What special factors aid in fixing such facts and materials in mind for more effective and ready use?

6. Taking up each one of the seventeen factors discussed in the text, try to see why and how it aids in fixing more firmly in mind the things to be learned.

7. Name and briefly explain two additional factors that aid a student in recalling and *using effectively* the knowledge he has acquired. (Compare section 2, (3).)

8. Compare and contrast the right and wrong methods of memorizing the materials to be learned.

9. What efficiency principles are chiefly operative in the memorization of new facts for effective use?

10. State normal effects of acquiring new facts in the most effective ways.

REFERENCES

- McMURRY, F. M. *How to Study, and Teaching How to Study*, chap. vii. Houghton Mifflin Company, Boston, 1909.
- MEUMANN, E. *The Psychology of Learning*. D. Appleton and Company, New York, 1913.
- PILLSBURY, W. B. *Education as a Psychologist sees it*, chap. ix. The Macmillan Company, New York, 1925.
- WATT, HENRY J. *The Economy and Training of Memory*. Longmans, Green & Co., New York, 1909.

CHAPTER XX

LEARNING HOW TO REASON OR TO SOLVE NEW PROBLEMS EFFECTIVELY

1. COMPARISON OF THE PROBLEMS OF ECONOMICAL LEARNING AND OF DOING CONSTRUCTIVE WORK

In the chapter on learning to read and again in the chapter on how to memorize we have emphasized the importance of acquiring facts in a way that would make it possible to use them effectively in the solution of new problems or in overcoming some of the many difficulties encountered in learning and in other work. Learning to recall only that part of one's knowledge and experience most useful in a given situation, and to apply it in the right way and at the proper time when confronted by a new problem or difficulty, presents the most important and difficult type of mental activity.

This type of activity is demanded each time that a new difficulty is encountered or that a student is confronted by a problem that demands a response which has never been made before and for which his earlier experiences or race habits have not prepared him directly. When a student is required to react to a new problem or to an old situation in a new or better way, an entirely different problem is presented from one in which he is required merely to learn new facts or to recall verbatim a bit of knowledge that has already been attached to a particular stimulus by previous training and practice.

The difference between such creative activity and mere acquisition may be illustrated by the two methods which students use in studying geometry. Some students memorize

the theorem and the steps in the proof, reciting them verbatim in class. Others reason out each step of the demonstration and seek to determine its exact relation to the preceding step, and when they see that it must follow they pass on to the next step in the proof. Both groups reach the same conclusion. The former reaches it by memorizing the proof; the latter attains the same goal by using in a systematic way certain facts which have already been verified and which are applied directly to the solution of the problem in hand. To memorize such a proof or series of facts is easy at first for some minds, but is expensive later on. All that one has to do is to fix the facts in mind as presented and to recall them in the exact order in which they were learned. It is also easy to know how much success you have attained. For this reason students fall into the habit of learning things verbatim instead of learning them in such fashion as will enable them to apply these things in new ways when confronted by any problem that they are required to solve.

In doing a constructive piece of work students face a new and unique situation, one which presents a type of difficulty that is not encountered in reading an assignment or in learning new facts verbatim. This is why this type of mental activity is so often shunned. It is more difficult than learning facts by mere rote, and its importance for success in real learning and in life is not recognized. But sometimes your main business as a student is to acquire new knowledge and facts; certain matters are placed before you in books or by your teachers, and you are required to master them, or to make them a part of your permanent stock of knowledge; at other times you are called upon to use the knowledge you already possess, in order to attain some new end that is set before you; often you are required to do both. It is the purpose of this chapter to explain what steps you should take to learn how to use your knowledge and experience most effectively when confronted by a new problem or difficulty.

2. THE REASONING PROCESS ANALYZED AND EXPLAINED

Students can perhaps best be helped in this type of learning if we describe the steps that must be taken in doing this type of work and show how improvement in each of these steps may be made. It will also help if we point out the chief difficulties that a student normally encounters in learning how to think or reason effectively and the habits that must be formed in learning to work in this creative way.

(1) Steps in the Reasoning Process

For a student to work in a constructive way at any task three conditions must always be fulfilled: (1) There should be a clear recognition of the problem to be solved or of the difficulty to be overcome, coupled with a real desire to solve or overcome it. Thinking or reasoning can only occur when a problem is presented which earlier experience and race habits have not prepared one to solve directly. The more clearly this problem is understood, the easier will it be to take the next two steps required to solve it. (2) A successful solution for the problem or difficulty must be found. (3) There must be prompt and accurate recognition of the attainment of the goal.

(2) Formulation of the Problem, or Clear Recognition of the Exact Difficulty to be Overcome

The first necessary condition for the application of the knowledge gained by the ordinary process of learning is a clear recognition of the problem to be solved. As soon as this problem is clearly understood, one begins to make a vigorous attempt to solve it, and for this he must have at his disposal certain information or facts and the ability to do the things required to bring about a desired result. He must also know when his goal has been attained or when the necessary steps

in attaining it have been taken. The means employed in effecting the solution are the facts and habits acquired by previous learning, which must be transferred from the connections in which they were originally formed and previously used and be attached to the new problem to be solved.

Thinking or reasoning, therefore, occurs because we are confronted by a problem or difficulty. Such problems man often sets for himself because of his desire to learn new things or because of the natural pleasure that is attached to such creative activity. This drives him on as well as grave necessity. Most thinking, however, arises from the fact that something is needed which instinct and acquired habits do not provide directly. For this reason students and other workers do most of their constructive work from dire necessity or because they must. But it is also true that they are sometimes driven on to do real constructive work because of inner urges toward creative activity of every sort. This native curiosity should often be appealed to in the course of a student's work. In fact, this instinct has driven man on to formulate problems and to make new discoveries in every field of science and has created all the best works of art in every field. It should, therefore, not only be kept alive but be definitely cultivated.

(3) How the Search for a Correct Solution to a Problem should be Made

When the problem is clearly apprehended, or when a student realizes that something is wrong or that something can be improved or changed, the next natural step is to make an analysis of the problem to ascertain exactly where the difficulty lies and the exact point that must be attacked to remove it. In doing this he casts about for means and summons all the information at his disposal that gives promise of aiding him in the solution of the difficulty. If the problem should be to determine what is wrong with an automobile that has stalled,

he would, for example, proceed somewhat as follows: He would recall other accidents of a similar nature and the cause of the trouble. He might recall that once the spark plug played out and test this hypothesis. At another time some dust got into the carburetor, and so he tests this hypothesis also. In this manner he would go on calling up one possible cause after another and applying appropriate remedies until the right one was found and the engine started.

When we bring facts from our past experience to bear on a problem in this manner, we form a series of judgments which consist merely of referring the new situation or difficulty to some old experience or general notion that has been developed by considering a number of older experiences. If, for example, your problem should be to decide what college you should attend, you would proceed somewhat as follows: You might recall that Indiana University is nearer your home; that Harvard has a more illustrious history; that Indiana has good laboratories and a well-trained faculty; but that Harvard is your father's alma mater. After recalling in this way a number of facts bearing directly on the problem in hand you could decide on the basis of these separate judgments which university you should attend.

In this recall and utilization of your knowledge your procedure should not be haphazard but very systematic, and your actions determined by very carefully chosen ideas. For example, "if the clock on the mantelpiece has stopped, and we have no idea how to make it go again, but mildly shake it in the hope that something will happen to set it going, we are merely fumbling. But if, on moving the clock gently so as to set the pendulum in motion, we hear it wobbling about irregularly, and at the same time observe that there is no ticking of any kind and come to the conclusion that the pendulum has somehow or other escaped the little catch that connects it with the mechanism, we have been really thinking. From the fact that the pendulum wobbles irregularly we infer that it has

lost its proper catch. From the fact that there is no ticking we infer the same thing, for even when there is something wrong with the clock that will prevent it from going permanently, if the pendulum is set in motion by force from without it will tick for a few seconds before it comes to rest again. The important point to observe is that there must be inference. This is always indicated by the word 'therefore,' or its equivalent. If you reach a conclusion without having to use or at any rate to imply a 'therefore,' you may take it for granted that you have not really been thinking, but only jumping to a conclusion."

In making these judgments and in drawing your inferences there is usually little foresight as to the responses that must be made to succeed, and no insight whatever as to the way in which your ideas or associations should follow each other in seeking the solution. Both are trial-and-error processes and depend upon the habits that you already possess and upon the way in which your knowledge in the field has been acquired. As you analyze your problem, various bits of helpful information are suggested by the elements of the situation that are separately attended to and by the play of the associations that these stimuli naturally call up. This normal procedure might be illustrated by the history of any important invention. In the invention of the cotton gin, for example, a preliminary analysis of the problem showed that it was necessary to find some mechanism that would catch the seeds and separate them from the fiber. To find such a device required many suggestions and considerable time to test all the ideas that this condition of the problem quite naturally called up. Finally a means was found to carry out the suggestion and to construct the machine.

Whether the solution of your problem depends upon the making of certain movements or upon the ideas that are recalled, the separate attempts come more or less by chance because they depend upon your previous knowledge and expe-

rience in the field and upon the way in which this information was acquired. The individual cannot control the recall of the correct ideas or movements directly. He knows the end to be attained, but cannot make the exact movements required to attain it; neither can he recall the ideas that are exactly appropriate to the situation. Some element in the situation must suggest an appropriate idea that will elicit the correct response. The best that a worker can do is to keep trying and to hold himself ready to utilize the suitable idea when it appears. Whether the correct response be an idea or a movement, it must be aroused by a stimulus and be tested by the student as it arises. All wrong ideas and movements must be rejected and the correct ones selected and definitely attached to the problem in hand. Just how this is done is not fully understood.

The final success in originating a correct response will, therefore, depend (1) upon how much experience one has had in the field, since abundant experience enables him to see old and familiar things in the new situation or problem, and (2) upon how promptly and profusely this information can be recalled when the problem is kept clearly in mind. This depends upon how these experiences were acquired, organized, and related to the other knowledge that you possess. The greater the number of associative bonds formed between each important idea or fact that is learned and the knowledge and information that you already possess, the more profusely and promptly will the appropriate ideas come up when they are needed in originating such new and successful responses. There is nothing occult about the invention of these new and successful responses. All takes place according to well-established laws, which the author has elsewhere attempted to explain.¹ But in every such case the correct response when originated must be recognized and permanently attached to the appropriate stimulus.

¹ Compare W. F. Book, *Learning to Typewrite*, chap. iv, pp. 64-86. The Gregg Publishing Company, New York, 1925.

(4) *Clear Recognition that the Desirable End has been Attained*

The last step in the reasoning process is, therefore, the clear and immediate recognition that your goal has actually been attained. The ability to select the correct response when it comes depends upon how clearly and well this goal or purpose is understood and upon how definitely it is kept before your mind as you work. Many students cannot tell when they have succeeded with a task or when a successful response has been made. This immediate appreciation of success is an essential factor in problem-solving. Any failure to select the right idea or the correct response when it comes, or the substitution of a wrong response for the correct one, is, of course, fatal to progress.

This ability to distinguish the right suggestion from the wrong one grows with experience and is aided by the clearness with which the problem or end desired is apprehended. It also depends upon the clearness and definiteness of one's *ideas* and upon the extent to which the correctness of this feeling of recognition or belief has been checked up in the past by actual proof. In the case of an expert the acceptance or rejection of a suggestion is certain and quick, but it is very hesitant and inaccurate in the man who knows less. It really depends upon experience and training. The expert has made it a point not only to secure much information in the field but to get it *accurately* and in a way that assures its ready and effective recall. He also makes it a point to test the accuracy of his suggestions by actual proof while he works. This the amateur has not taken the trouble to do; he, therefore, has greater difficulty in recognizing and selecting the correct solution when it is presented in the course of his experimentation and work. In fact, there are many instances in problem-solving where the right response is made, both by animals and by human beings, without the recognition that the goal has really been attained. That is to say, the problem is solved

without the student's knowing that he has succeeded. This is true because he does not clearly understand the problem to be solved and has not been required to test the accuracy of his inferences for himself.

(5) *Testing the Accuracy of your Decisions and Work*

When the solution comes, it is tinged with a feeling that we call belief. But since this feeling is often wrong, as already shown, a student should form the habit of testing for himself the correctness of all his solutions and decisions.

One may prove the correctness or falsity of a statement or of the solution of a problem by referring it to what he already knows and has verified. These earlier experiences may be formulated in terms of general principles or laws which have already been accepted and been proved true, or these experiences may be more particular. If the justification is by reference to older organized experiences, the process of testing the validity of your judgment is called deduction. If you prove a certain conclusion by referring it to some particular experiences or a crucial case, you use a method that the logicians call inductive proof. The only difference between these two methods of proof is that in induction the separate instances are kept distinct either as single cases or as averages of a definite experimental series, whereas in deduction proof is given by referring the solution to a general principle which has been developed from experience or which is so generally accepted that no one thinks to ask what the particular instances are that led to its formulation and acceptance. Proof therefore consists very largely in making more definite and explicit the knowledge that leads to acceptance of the solution.

Both the judgment and the process of proof rest, therefore, upon the presence in the individual of definite knowledge held in the form of concepts or general principles. These make it possible to think of the many individual instances in

a single thought. When such ideas are developed, they are used *in place of* the particulars, both in forming judgments and in testing the validity of the conclusions drawn. This makes it possible for such an idea not only to represent all the particular cases which make it up but to take the place in thinking and reasoning of all the individual cases, without the loss of accuracy or meaning.

Reasoning, or learning to solve problems, is therefore the most important and difficult of all the mental processes that take place, but it is developed from the same principles as the simpler mental processes. It always starts because the worker's progress has been thwarted by some obstacle to thought or to his physical progress. This difficulty is first analyzed into its elements, so that we may proceed with its solution as quickly as possible. In general, many attempts must be made before a suggestion appears that meets the situation satisfactorily. These various trial attempts are rejected one after the other until one appears that succeeds. This correct solution is then accepted immediately because the suggestion, when it appears, is felt to be in harmony with past experience or with certain facts that are already accepted or proved. After this the suggestion or solution may be proved to the satisfaction of another or to yourself by making explicit references to generally accepted principles or to concrete facts.

Because we cannot recognize accurately and directly the correctness of our solutions or beliefs, all students should form the habit of testing the validity of their work in the ways that science has devised. It is not enough to solve the new problems and difficulties that you meet in the course of your work; you should know that your solutions are correct. You should therefore learn not only how to do creative work but how to test the accuracy of your results. The rest of the chapter will be devoted to explaining how both these things may best be done.

3. LEARNING HOW TO REASON EFFECTIVELY

Our analysis of the reasoning process has already revealed many of the things that a student must do to learn to think and reason effectively. But we should perhaps point out more in detail (1) just what should be done to succeed with this type of learning, (2) the special habits that must be formed in acquiring this type of skill, (3) how these habits are actually acquired, and (4) the more important difficulties that are normally encountered in learning to do this type of work.

(1) *Aids to Finding the Correct Solution to your Problems and Difficulties*

Attend to the method used in acquiring new knowledge and facts. Whether or not the right ideas are recalled when you are confronted by a new problem, that is, the ideas which will enable you to meet the difficulty in a successful way, depends upon the nature of the knowledge and experience you already possess in the field and upon the way in which this knowledge was acquired. As was pointed out on pages 396-398, the facts and experiences which the worker has already acquired must be recalled and fitted into the present situation. The more facts you possess that bear directly upon the problem in hand the more likely will you be to solve it. If you are going to reason effectively about any topic or do constructive work in any field, you must therefore know many facts in that field. One reason why students have difficulty in reasoning about certain subjects is that they have too few facts in the field; or they may have difficulty because the ideas they possess are not definite and clear. Every new fact that you acquire will make you better able to reason in that field, provided this fact has been acquired in a way that will permit its prompt recall and accurate use *in other situations besides the one in which it was learned.*

You should, therefore, avoid the memorization of facts in the same pattern in which they are given to you in lectures or in books, but acquire your knowledge in a way that will make your ideas arise promptly and profusely when confronted by any new problem or task, or in a way that is generally applicable to any situation. Learning to think and reason is conditioned in part by how much you have learned in the field in which your problems lie, but more by the way in which this knowledge or information has been acquired. In such subjects as history, psychology, and the sciences you should, therefore, not attempt to memorize the facts as they come in the text, but seek to discover all the relations that exist between them. In the study of every subject, in fact, you should set before yourself numerous problems to be solved, making your study a process of constructive thinking rather than a mere acquisition of the facts.

State your problem definitely and see that it is clearly understood. The first essential in learning to solve new problems in an effective way is to understand what your problem or difficulty really is. The best aid to this end is to phrase the problem for yourself and to state it in the simplest possible way. One definite aid in learning to reason is, therefore, to form the habit of stating everything worked at in the form of a problem; you should often ask what your problem really is, and keep thinking about it as you work, analyzing it from as many different points of view as possible. If this procedure is continued long enough, a suitable suggestion for its solution will sooner or later be presented by some of the known elements in the situation or by the so-called free associations which this procedure quite naturally brings up through the process of recalling what you already know about the subject.

Keep this problem definitely before your mind as you work. This problem when definitely stated and clearly understood should be kept continually before you as you work and should

often be referred to, because it directs the flow of the associations which bring up the bits of knowledge that must be used in the solution of the problem.

Make an accurate and detailed analysis of the problem to be solved. You should also form the habit of making an accurate and detailed analysis of each problem to be solved and of each difficulty encountered, because this makes it possible to establish a linkage between some of the known elements in the situation and the responses which you are required to make but which have not yet been joined to the present situation. The task presented to a student when such a new response must be originated and definitely attached to the new situation or stimulus becomes one of finding in the situation or problem an element which is capable of arousing the desired response. This is done by recalling certain bits of knowledge or experience that will elicit the desired response, a process that is greatly aided by making a careful analysis of the problem to be solved. A student must, therefore, continue in his attempts to reduce the problem to its known elements until a successful solution is suggested. If the problem is carefully analyzed and clearly understood, a definite reference to something else that will enable you to begin the steps that must be taken to solve it correctly will sooner or later present itself.

Sometimes the problem seems so simple and clear that no detailed analysis need be made. At other times it is so difficult and complex that a successful analysis can scarcely be made. You should therefore learn to distinguish between the situations in which you may to advantage proceed by pure chance movements, or by letting any associations come up that will, and the situations in which you should analyze the problem presented for the purpose of selecting the most advantageous point of application for your trials. In every case of reasoning some analysis of the difficulty which occasions it should precede action in the matter. Much time and effort may be saved if this is carefully done.

Begin by recalling all the knowledge and experiences that bear directly on your problem or difficulty. After the problem is clearly stated and definitely understood, recall all the facts and experiences you possess that bear on the problem, and fit them into the present situation. The more you possess of pertinent facts, and the more promptly they are recalled, the more likely will you be to solve your problem. Each new fact that you acquire will make you a better reasoner in that field, provided it has been learned in a way that will permit its use in other connections than the one in which it was acquired.

Recall these facts and experiences in an orderly and systematic way. These ideas and experiences, to be effective for solving your problems, must arise promptly when needed, and in an orderly way. To insure this prompt and orderly recall you must use the method of learning described in the chapter on memory, and form the habit of thinking systematically about *all* the situations that you meet, for this helps you to recall the particular bits of knowledge that are needed to solve your problem. To make sure that the ideas and experiences will be recalled which are most pertinent to your present needs you must keep your problem definitely before you and must have acquired your knowledge in the ways already indicated in Chapter XIX. It is well to remember that things can be recalled only as they were learned or impressed.

See that all your ideas are definite and clear. But effective work in reasoning is conditioned by other things besides the number of ideas that you possess. Your ideas must not only arise promptly when needed, be pertinent to the matter in hand, be recalled in an orderly manner, but be very definite and clear. Many students are unable to do original work because they have not formed *clear* ideas about the things that they have learned and cannot make definite statements about anything. They have failed to learn the meaning of important technical terms and do not clearly comprehend what they have memorized or learned. You should therefore take definite

steps in your study to clarify the ideas that you acquire in every field of learning, by defining all important terms accurately and as far as possible in your own words. A good habit to form would be to make up accurate definitions of your own for all important terms that you meet in your work. A large stock of such definitions will help you to think not only rapidly but accurately, because they stand for a large group of individual experiences. If you have a clean-cut definition for each of these terms you can readily differentiate between them and draw valid conclusions, but if your ideas are vague and inaccurate you will not be able to use them correctly in solving your problems.

Think systematically about all similar situations that you have met. In the process of acquisition, and again when you are confronted by a specific problem or difficulty to be solved, you should try to think of all similar situations that you have met. This will help you to recall the ideas that will enable you to elicit the correct response. In all learning you should make it a point to classify or organize all the knowledge that you acquire, grouping similar ideas and points together. If this be done, you can more readily place each idea, as it is recalled, in its proper class or group. By learning the definition of all important terms that you use in your thinking and work and by seeing that you use only the words that express exactly what you mean, you will learn to think not only clearly but accurately as well. This is helpful, for you cannot judge correctly of the pertinency of a principle or fact for your present purpose unless it is clearly and correctly understood.

Read about similar problems and their solution. It would also help to read about similar problems and their solution, for this often gives one a clue to the solution of his problem, even if what is read does not bear directly on the point at issue. It also aids you in recalling helpful experiences and facts. But it should be remembered that the ease with which the proper associations or correct suggestions arise in the mind when one is confronted by a new difficulty or task depends upon the

mental habits which you have already formed in the process of learning, upon how your knowledge has been acquired, upon the amount of information that has already been obtained, upon the clearness with which these ideas are apprehended, and upon the promptness with which they can be recalled and evaluated when needed.

Keep thinking about your problem until you succeed. You must also keep thinking of your problem from every point of view until the correct suggestion appears and is selected. You cannot control your associations or responses directly. All that you can do is to keep trying, to keep your purpose definitely in mind, and to hold yourself ready to utilize or lay hold of the suitable idea when it appears. This keeps you keenly alive to the needs of the situation and helps you to recognize more correctly each step in advance that you are able to take, also to realize when your goal has actually been reached. The awareness that your purpose has really been attained is one of the most important steps in the entire reasoning process and can be facilitated only by getting and keeping more definitely in mind just what you are trying to do.

Believe that you can and must succeed. Much also depends upon the attitude which you assume toward your problems and toward this type of work. You must have confidence that a right solution will be thought of, and keep trying until you succeed. You must also believe that you can and will succeed, and form the habit of continuing your thinking and efforts until a correct solution has been found. This confidence in your ability to succeed can, of course, be developed, and must be cultivated in ways that have already been described in Chapter XVI. The key to the situation lies in arranging conditions so that you will succeed with every problem that you try to solve. This may be accomplished by suitable encouragement and by practicing with relatively simple problems until the habit of trying patiently until you think of the right solution has been established. Nothing can take the

place of this habit of believing that you really can solve all the problems you encounter, for this attitude makes it possible for you to keep on trying until the proper suggestion appears, and until a successful solution to your problems is found.

(2) *Aids to the Correct Recognition and Verification
of your Results*

The most important phase of learning to solve problems is the selection of the correct suggestion when it comes. This step in the reasoning process is aided by a number of the habits that have already been described as aids to finding the correct solution to the problem selected. For example, the first requisite and greatest aid for judging correctly when your goal has really been attained is to get a clear and definite understanding of your problem or the exact difficulty to be overcome.

A second aid to a clear recognition of the correctness of the end to be obtained and of the steps that must be taken to attain it is to increase the breadth and accuracy of your knowledge and experience. If you have many *clear* and *correct* ideas in the field or know the subject thoroughly, your acceptance or rejection of the various suggestions that come up as you work or that are presented in the course of your reading will be valid or at least worthy of respect and definite proof. If you know less of the subject or if your ideas are vague and inaccurate, you can assign little importance to your beliefs. Since such knowledge can only be acquired in advance, all that need here be said on the point is to emphasize the general value of acquiring a *wide range* of *accurate* knowledge and to see that all your ideas are definite and clear.

Form the habit of recalling all the facts before a decision is reached. If your problem is clearly stated and all pertinent facts have been recalled in an orderly and systematic way, the decision what to do next and the awareness that your goal

has actually been attained come naturally and correctly. But such decisions should not be made hastily or on the basis of too few facts. You should wait in making your decisions until all the ideas that bear directly on your problem have been recalled. It is fatal to make a judgment before you have carefully canvassed all the facts; this is what the superficial thinker does. A well-trained worker rarely makes this mistake, because he refuses to decide until he has assembled and carefully considered all the facts.

Form the habit of testing all your suggestions and conclusions. Much also depends upon the attitude which you assume toward the product of your own thinking and work and toward the materials that are presented in your reading. Every student should form the habit of asking continuously whether the statements made and the ideas which present themselves while he is working on a problem are really valid and pertinent to the problem in hand. Some are inclined to accept everything that is presented and so never learn to judge anything accurately for themselves. They are therefore unable to pass judgment on the validity of the steps that are being taken in doing original or constructive work. No real progress can be made in this phase of the reasoning process unless the habit is established of questioning each suggestion that comes up in our thought and in what we read or hear, definitely checking it up in the light of its actual agreement with what has already been learned or proved. Such a habit is essential for every individual who would think for himself or succeed with any type of creative work.

Test all general notions and principles used in proving your conclusions. Since the feeling of assurance that is normally attached to our inferences and judgments is so often wrong, it should regularly be checked up by further demonstrations or by actual proof. To make your feeling of assurance more reliable and to know that your work is correct you must make it a practice to verify the validity of all your conclu-

sions. One essential in this process of proof is to make sure that the validity of each general principle you use in reaching a given conclusion has itself been established. If this be made a general habit of procedure in your work, one necessary step in learning to reason has been taken.

Test especially all conclusions based on analogy. You should especially learn to recognize clearly and definitely the limitations of all conclusions based on analogy, both in the reasoning you do and in accepting the arguments and conclusions of others. To reason by analogy is to regard an assertion as proved by a fact observed in one or more instances which are taken to be like the case in question. If the likeness is real, the conclusion is valid; if the likeness consists in nonessentials, as is often the case, the conclusion may be entirely misleading. Improvement comes when the student gets a clear recognition of the likelihood of error in such reasoning in all cases where it is appealed to. You should, therefore, learn how to make a right adjustment to such arguments in your own work and in judging the conclusions of others.

Note carefully the methods of proof used by the experimental sciences. One of the best aids to reasoning and creative work is to note how the validity of conclusions and facts is tested today in the various experimental sciences. You should make it your practice not only to understand but to apply these methods in your own work. The best training anyone can get in inductive reasoning (that is, establishing general principles from particular observations) is by actual work in the various experimental sciences. To know that relatively few observations in a physical science, under definite conditions and with material that is subject to little variation, may give valid conclusions, whereas if all these conditions are not definitely controlled many more observations must be made, is of great value in the thinking of everyday life. This is why college students are usually required to take one or more years of work in a science as a part of their regular college course.

4. SPECIAL HABITS TO BE ESTABLISHED AND DIFFICULTIES TO BE OVERCOME

In acquiring your knowledge you should, therefore, form the habit of correct thinking: the habit of analyzing all your problems, the habit of questioning the validity of all your conclusions and the accuracy of your work, the habit of reducing each element in a proof to its lowest terms. These are needed for reaching a correct solution to your problems and for doing your work in the most effective way.

The suggestions that have already been given on learning to reason reveal at once the more important habits which a student must form in learning to do this type of work. They also indicate some of the more important difficulties encountered in doing and in learning to do creative work. One of the most common difficulties encountered by students in learning to reason effectively is that they do not make it a point clearly to understand their problem, or fail to keep it definitely before them as they work. Often the ideas and facts that they have acquired are not definite and clear because they have not taken the trouble to get clear ideas about the things they have learned. As a result their knowledge is too vague and inaccurate to be effectively used. Or it may be that the ideas they have acquired do not come up promptly and in the right way when they are confronted by their difficulties and tasks. This difficulty can be corrected or avoided only by forming the habit of acquiring your knowledge and facts in such a way that they can be effectively applied and by increasing not only the accuracy and definiteness of your knowledge and experience but also their breadth. In no other way can you make the right ideas come up correctly and more promptly and profusely when needed in doing constructive work.

Since learning to think and reason effectively is at bottom a matter of forming certain specific habits and of avoiding or overcoming such difficulties as we have just mentioned, you

should make it a point to establish the particular habits already enumerated and to eliminate the wrong habits that you have already formed. This can be done only (1) by taking careful stock of the habits of study and work that you already possess, eliminating those that are useless or bad, and (2) by developing certain other habits that must be established and used if you would learn to do creative work.

(1) *Taking Stock of the Habits of Study and Work which you Already Possess*

Each student has already formed certain habits which either aid or retard him in doing creative work: if not habits of carefully looking into things, then habits of hasty, heedless, impatient glancing over the surface. He is therefore molding himself either into an accurate and effective reasoner capable of working in a systematic and effective way at all his tasks or into a careless, inefficient thinker and worker.

(2) *Specific Habits that Must be Formed*

Learning to reason and to solve your problems in the most effective way is at bottom a matter of forming certain specific habits, as we have already shown. Among these the following may be mentioned in review:

1. The habit of stating in the form of a problem everything worked at, making it a practice often to ask what your problem really is, keeping it clearly and definitely before you as you seek to solve it or try to find a way out of your difficulty.
2. The habit of learning all new facts in a way that will make your ideas arise promptly and profusely when you are face to face with a new problem or difficulty. This involves the acquisition of many facts in every field and the habit of organizing them in a way that will relate them properly to what you already know and get them correctly classified. The more ideas

you have and the better you have trained yourself to use the information you already possess, the better able will you be to recall and use the facts you need to solve new problems as they arise. Acquiring the habit of working in this way is one of the best aids to reasoning and creative work.

3. The habit of reserving your decisions until all the facts bearing on your problem are in and have been properly canvassed, or, if you do not have all the facts needed to solve it, taking steps promptly to acquire and test them before you draw your conclusions.

4. Lastly, the habit of testing your conclusions and beliefs and those of others so that your feeling of assurance may be corrected and your knowledge of the correctness of your conclusions and work carefully tested.

5. GENERAL VALUE OF THIS TYPE OF LEARNING

In acquiring skill in this type of work by the establishment of these and other habits a student makes himself a creator, a leader, an independent thinker or originator in one or more fields of human endeavor instead of a mere imitator or follower. Moreover, a student who learns to make the right sort of application of his knowledge and experience when he meets the difficulties normally encountered in his play and work, and who learns how to use his knowledge and experience in an effective manner in solving new problems, gets a delight out of his work that a student who merely memorizes information or facts can never know. And what is more important still, the success of such a student in life will be assured because he has learned how to meet difficulties and how to solve new problems in a successful way, or how to do effectively a type of work which the world wants done but which most persons have never taken the trouble and time to learn to do.¹

¹ For further emphasis on this important point see Chapter XXII.

EXERCISES AND QUESTIONS ON THE TEXT

1. How does doing a new and constructive piece of work differ from learning things verbatim?
2. What is the practical relationship between the right method of acquiring new knowledge and facts and the ability to do constructive and original work?
3. Name and briefly explain the necessary steps in the reasoning process.
4. Why is it important to formulate clearly and definitely the problem to be solved, or to understand clearly the difficulty encountered?
5. How should one proceed in making a search for the correct solution to a problem?
6. Upon what does one's final success in originating a correct response depend?
7. Why is it so difficult in this type of work to foresee the exact responses that should be made?
8. What are the best aids to finding a correct solution to a new problem or difficulty? (Compare section 3 (1).)
9. Take up each one of the eleven aids discussed in the text and work out for yourself how each helps a student in learning to find the correct solution to his problems.
10. Point out the practical importance of being able to recognize accurately and quickly the desirable end when it has been attained.
11. How may a student or worker be aided in recognizing more quickly and accurately when he has attained his goal? (Compare section 2 (4), and section 3 (2).) In your study of this problem enumerate first the aids to more effective recognition of the correct result, then point out how each one of these factors helps you in recognizing the accuracy of your result.
12. Why is it important to test the accuracy of your decisions and work? How may this best be done?
13. Enumerate the more important habits that must be formed in learning to reason. Why is it necessary or advisable in learning to reason to take stock of the habits of work that you already possess?
14. Point out the general value or importance of the type of learning discussed in this chapter.

15. Prepare a carefully-worded written plan for learning to solve new problems effectively, and keep a record of how much this method helps you.

16. Can you suggest or devise a way of measuring the actual progress you are making in this type of learning?

REFERENCES

- KITSON, H. D. *How to Use your Mind*, chap. vii. J. B. Lippincott Company, Philadelphia, 1916.
- McMURRY, F. M. *How to Study, and Teaching How to Study*, chaps. vi and viii. Houghton Mifflin Company, Boston, 1909.
- PILLSBURY, W. B. *Education as a Psychologist Sees it*, chap. xi. The Macmillan Company, New York, 1925.
- PILLSBURY, W. B. *The Psychology of Reasoning*. D. Appleton and Company, New York, 1910.
- WOODWORTH, R. S. *Psychology*, chap. xviii. Henry Holt and Company, New York, 1921.

CHAPTER XXI

HOW TO KEEP YOURSELF FULLY AND CONTINU- OUSLY APPLIED TO YOUR WORK

Throughout the discussions of this book special emphasis has been placed upon the importance of acquiring right habits of work because these alone enable one to apply his knowledge and powers in the most effective way to the performance of his tasks. In a sense the entire discussion of the book has centered around the problem of learning how to apply one's energies more effectively and continuously to his tasks. The importance of this problem and the practical difficulties to which it naturally gives rise are generally recognized, for when some 1500 students at Indiana University were asked to name the most important difficulties they encountered in their work, 84 per cent named lack of concentration (meaning thereby the inability to apply themselves completely and continuously to their tasks) as their chief difficulty. In view of this fact we shall in this chapter try to show how a worker may proceed to keep himself more fully and effectively applied to his tasks. To do this we must explain (1) what attention really is on its practical side and (2) how the most efficient habits of attending are acquired.

1. THE PROCESS OF ATTENDING ANALYZED AND EXPLAINED

In a practical way everyone knows what we mean by attention or the ability to concentrate one's mental energy and powers upon some particular object or task. The importance of attention for all learning and work is likewise recognized. When we attempt to measure the mental ability of normal

adults, we do so by means of tests that require complete concentration of attention. In judging the intelligence of people with whom we associate every day we regard those who are able to maintain close attention for long periods of time as superior in intelligence. And most persons regard a philosopher or scientist who becomes so absorbed in his work that he neither eats nor sleeps until his problem is solved as a very superior sort of individual.

We shall, however, better understand the real problem of this chapter if we select for our analysis and study some concrete situation that illustrates what actually happens when an individual attends or concentrates his mind completely upon some particular object or task and keeps it continuously applied to this problem for a definite period of time.

If you will try the experiment of concentrating for one minute on the large letter X and then turning your mind back quickly at the end of that time to observe what actually happened, you will notice a number of important things about attention or how your mind actually behaves when you are working at your tasks: (1) It will be noticed that this letter X which has been thus definitely selected and focused upon becomes very distinct and clear while all surrounding objects become more indistinct or fade entirely from consciousness. (2) As you try to keep this object in the focus of your mind, ostensibly focusing all your mental powers upon it, you will notice that you are vaguely aware of a number of other things also. You may vaguely see some of the words on this page, or other objects in the room, all of which are making impressions upon your eyes. You may be slightly conscious of some of the sounds that are present in your room or of the sensations that come from your clothing or parts of your body. You will notice, if you observe carefully enough, that your mind also contains, at the same time, certain ideas, images, or thoughts *about* this letter or relating to other things. That is to say, a number of other things are present in the mind as you try to

focus upon this object completely. (3) If you examine these marginal objects further, you will find that they are constantly tending to crowd into the center of consciousness or, as we say, to attract your attention to them. If you look still further, you will observe (4) that your mind behaves very much like a stream that is ever in motion. As your mental activity goes on, one object after another is selected, grows clear and definite while it is held in the focus of attention, only to be supplanted the very next moment by something else. There is, in fact, a continual shifting of the objects that occupy the center of the mind while we think and work, which is but another way of saying that the mind is forever changing and if left absolutely to itself it would be in a constant state of flux, the changes being controlled by the nature of the stimuli that are continually impressing us both from within and from without the body.

If you should take as a concrete example the study of this chapter, you would find that the main ideas presented in the text would be successively selected, focused upon, and held in mind until clearly understood and their relation to each other and to other related ideas definitely thought out. The things in the margin of your consciousness, that are competing for first place in your mind and so acting to divert attention from your work to themselves, would consist of certain externally aroused sensations, such as the glare from your study light, the excessively hot or cold temperature of your room, sounds from a phonograph in the next room, etc. Certain sensations coming from your own body might also tend strongly to crowd into the focus of your mind, such as pains in your shoulders and back due to excessive work, sensations coming from your eyes because they are too dry or tired to feel normal, etc. Irrelevant ideas that are only indirectly related to the work now being done will also tend to crowd into the focus of your mind unless the problem that is being worked at is firmly held in mind. Such marginal ideas and sensations are in

the mind even when you conscientiously try to focus it completely upon the exact work that you have in hand, and they can be ignored only by concentrating your energies more fully upon the object that is occupying first place in your mind at the time.

The task of paying attention, therefore, involves (1) selecting some object or task to be noticed and definitely worked with; (2) maintaining this desired object or task in the center of the mental field and keeping your mind so completely focused upon it that no other object or idea can possibly crowd it out.

This fact of selection is one of the most fundamental characteristics of our mental life. We are so constituted that certain stimuli have a greater prepotency for attention than others. They therefore come to be selected because they make a more direct and strong appeal to our senses and mind, which means that they will be noticed and kept in the focus of attention at least for a time. In the course of a student's experience and work many things are presented to his senses that he does not notice at all. Other things are presented which he might become aware of, but which he fails to notice. Some things are often selected and seen clearly; others are rarely selected and seen but vaguely.

The act of attending may, therefore, be broken up into the following natural divisions or steps: (1) the selection of the objects or tasks to be worked with; (2) the range of attention or size of this focal field, or number of items that can be attended to at once; (3) the completeness of concentration, or extent to which the mind can be completely focused upon the objects or tasks selected; (4) the duration of attention, or length of time that one's mind can be thus fully applied to one object or task.

The normal result of this process of selection and the consequent focusing of one's mind and mental energy upon the thing selected is that it at once becomes more distinct and clear

while everything else becomes more vague and indistinct until it is finally not noticed at all. In order that a stimulus may produce a sufficient impression to make an animal aware of it or to influence the animal's responses, it must be selected and definitely focused upon. The more completely our energies are concentrated upon the objects selected, the more of an impression these objects will make.

2. LEARNING TO ATTEND IN THE MOST EFFECTIVE WAY

Two of the necessary conditions for all learning and for personal efficiency in work are therefore a proper selection of the things to be worked with and a more or less complete concentration of the mind upon the work to be done. Human efficiency in every field depends upon the selection of the proper details and upon the amount and character of the concentration that is put upon the objects selected. These conditions determine the degree of knowledge that will follow upon our awareness of the things selected and the efficiency of our efforts when directed to the performance of a given task.

Learning to attend would therefore involve (1) certain improvements in the selection of the things to be concentrated upon or worked with; (2) definite gains in concentration or in the completeness with which one's energies and powers can be applied to the objects or tasks selected; (3) increasing the length of time that one can thus apply himself completely and effectively to the object selected or to the task in hand; lastly, (4) enlarging the scope of this focal field or increasing the number of things that can be successfully worked with at any particular time. These essential phases of the attention process will be separately discussed and definite suggestions given for making improvements in each of these lines.

(1) *The Problem of Selection in Learning and Work*

a. FACTORS THAT DETERMINE SELECTION

Kinds of stimuli always selected. The aspects of the outside world which naturally attract attention are the intensity of the stimulus, its size, and the length of time that it is present. The stronger the stimulus the more likely it is to be noticed. A strong light, a loud sound, a penetrating odor, will force themselves into the focus of the mind where a fainter stimulus would be unnoticed. The preceding stimulus also has much to do with determining what will be selected or attended to. A diminution of the intensity of a stimulus or any change in a stimulus or in our surroundings will also force us to attend and make us more ready to act in a suitable manner. In the struggle with the dangers and enemies to life in the external world only those creatures and species have survived who noticed changes of every sort. The others were destroyed by the larger animals that approached them unobserved, or by failing to notice the smaller ones that might serve as their natural food.

An inattentive student in a class will, therefore, be as much attracted by a pause in the instructor's lecture as by an increase in the loudness of his voice. In like manner large objects tend to force themselves upon us. They are more likely to be noticed than small ones, although things are not selected entirely on the basis of their size, as the results of experiments in the field of advertising conclusively show. Familiarity and increase in the duration of a stimulus also favor its selection as a rule, but if a stimulus is too long continued we make a negative adaptation to it, which means that it is wholly ignored.

Influence of habit upon selection. More important still is a set of psychological or subjective factors which favor the selection of certain stimuli to the neglect of others. The first and foremost of these subjective factors is the law of habit. What

an individual will select or attend to depends very largely upon his education or previous experience and training. These give certain stimuli and objects a prepotency over all others. To understand fully why an individual attends to the particular things that he does, we must therefore know the more important elements in his earlier education and training. These determine not only the effectiveness of attention by increasing the degree of concentration that can be placed upon the objects selected, and the length of time that this object can be focused upon or worked with, but also the direction which his mental activity will take. We see what our education and training has prepared us to see, without any intention on our part to see it. Any object, in fact, that fits into the general framework prepared by previous education and training impresses us at once. A student with one type of training and experience will select and see one thing, an individual with a different type of training and experience will select something else from the same environment. In fact, so strong and universal is this law that we may judge what one's experience and type of training has been by observing what he will notice when confronted by a particular situation or group of stimuli. An engineer will see one set of facts, a teacher another. A student of psychology will notice many things, both inside and outside the laboratory, that he did not notice before. In fact, each object seen, each new fact acquired, prepares one to see something else, and thus widens his capacity to acquire new knowledge in this and related fields. One of the strongest determiners of the direction which one's mental activity will take is therefore the habits which have already been acquired.

Selection influenced by ideas already in the mind. What an individual will attend to or select also depends upon his mental set or attitude at the time, and upon the ideas which are actually present in his mind. If, for example, one has been observing an object attentively and it reappears after a short

interval, it is likely to be noticed again. This can be demonstrated by looking at any puzzle picture or puzzle card. After you have once seen the lion's head in the tree, you cannot help seeing it when you glance at the picture again. It always stands out prominently thereafter whenever you glance at the card. The same thing holds for our memories. If you can recall the image of an object you desire to see (for example, the color and size of a book), you will be able to pick it out of your environment much more readily and surely than if you do not know what you are looking for.

The explanation of such prepotency among stimuli is believed to be the fact that the idea of the object in the mind excites the same areas in the brain that are affected when the object is presented to our senses. These brain cells are therefore more ready to act and so can respond more quickly and strongly when that particular stimulus is presented, giving it enough prepotency to insure its selection over all others that are active at the time.

Selection influenced by our purposes and desires. The same thing holds for one's purposes or desires. If definitely formulated and held in mind they determine the direction that one's mental activity will take and help to decide what will be selected or attended to. Even the tasks which a student sets for himself or that are set for him by his instructor serve to direct his mental activities toward certain objects and things. To a very large extent one sees what he desires to see or is asked to see, while all else is passed unnoticed. The effect of this factor is so great that a student may believe he sees or feels something that is really not there, as when he mentally experiences a shock from an induction coil where no current is present or fancies he smells perfume when only water has been sprayed into the air from a bottle labeled "Perfume." This is almost sure to happen if he has been told that he could smell it and is asked to tell what kind of perfume has been used. This idea implanted in the mind is strong enough to produce this

effect without the appropriate stimulus. The action of the same factor is illustrated when a man looks at his watch to see whether the numerals are roman or arabic. If you should ask him what time it is after he has thus glanced at his watch, he would be unable to say, because he looked at his watch with a very different purpose in mind.

Selection influenced by a definitely formulated question or problem. One of the most important factors determining the direction which our mental activity will take is therefore the questions which we set for ourselves or that are given us by others, and the conscious and unconscious purposes that are dominant at the time. These determine what we shall notice and become aware of. And since we can notice only one thing at a time, everything else will be rejected or remain unnoticed.

It is, in fact, difficult for a student to attend intently to any subject or object unless he asks questions about it and has sufficient knowledge concerning it to formulate such questions for himself. To interest himself in a particular subject or task a student must therefore acquire enough knowledge in the field to enable him to raise a number of important questions about it. These he begins at once to investigate and answer. Each answer given suggests a new question or problem which impels him to make further observations and investigations of the topic in hand, and so keeps his mind focused upon the problem selected. To be able to concentrate his energies fully and continuously upon any topic or task, a student must therefore be able to ask many questions about it and must actually be seeking an answer to the questions he asks.

Instinctive or racial determiners of selection and basis for voluntary or forced attention. But sometimes a student attends to things that seem to be wholly out of harmony with these principles or laws. This is characteristic of the type of attention that we call voluntary, where one gives attention to unpleasant subjects and selects for consideration objects that are out of harmony with the mental attitude that is dominant at

the time. In all such cases of pure voluntary attention the student is really working for the attainment of some remote end that is dictated by some social or racial instincts that are driving him on and determining the selection of the stimuli or ideas that are dominating his consciousness at the time. These native tendencies to selection are even stronger and more persistent than the habits that have been acquired during the span of one's own individual life. "When a student attends to a lesson because he must pass an examination, the real reason for the selection and his continued application to this particular task is the enjoyment that comes to him from the approval of his teacher and fellow students, or more immediately, perhaps, from the displeasure that he receives from their disapproval." When a student works for the good he can get out of a certain subject or course, the real spur to his efforts, and the thing that determines his persistence, his attention, and his action, is the pleasure that comes from the exercise of his native curiosity or inner desire to know and learn, from the approval which comes from the world at large, from his family and friends, and from the thought of success which he will be able to attain in later life as a result of this training and knowledge. "His profession has been chosen because it is respected by the world or that part of it which he knows; his courses are chosen because the authorities of the school believe that they are needed to make him an expert in that profession, and he strives to do well in them because they help him towards that end." In other words, the forces that impel a student to do what is immediately unpleasant and that determine the selection of such tasks are social and instinctive.

The process of selection is therefore not merely an expression of one's previous education and training or of the history of the individual in question but of the instinctive tendencies which he inherits and which in reality represent the experiences to which the race has been subjected long before his own individual existence began.

Summary of influences determining selection. The real factor that determines which particular aspects of the external world will be selected by a student in the course of his work and play is therefore the structure and organization of his nervous system and the character of the stimuli that are affecting him at the time. His nervous system has been formed by the slow progress of evolution, which has left its traces upon him in the form of certain linkages or inner tendencies toward more or less definite types of mental and physical activity. These make him more receptive toward one class of stimuli than toward another. His nervous system has also been modified by the stimuli that have acted upon him since birth. It is temporarily modified by the immediately preceding experience, by the ideas in his mind, by the question that has just been asked, by the problem that has been set, or by his purpose and attitude at the time; and back of all by his general education and the more permanent ideals and purposes that he has derived from the society in which he lives and the ideals which this society enforces upon him because of the instinctive pleasure which he feels at its approval and the personal suffering that is produced when it disapproves of what he thinks or does. A student's attention or the process of selection of the stimuli that will dominate and direct his mental and physical activity at any time is therefore the resultant or expression of all the influences that have acted upon him since birth and of the native tendencies that were present at birth in the form of his racial heritage.

Selection in the realm of ideas. Nor is the case different in the realm of ideas. Attention determines whether one or another of two ideas, each offered by a different association in connection with the idea dominant a moment before, shall enter the mind. A student's mental life is a mixture of the materials furnished by the senses, and of the ideas that are provided by the memory elements or images that compete with the sensations for the control of consciousness. At such

a time what he will recall depends upon his mental attitude at the time and upon the same group of factors that we have described above for sensation. In the control of ideas as in the control of observation it is the student's mental attitude or purpose that determines which idea shall be selected or become dominant in the mind at any given time. If a particular word or thought is presented to a student when he is trying to solve a problem of one sort, one idea will be recalled; if the problem is changed, an entirely different idea will arise. For example, if the following numbers, 23 and 13, are presented as a stimulus and placed one above the other, thus: $\begin{smallmatrix} 23 \\ 13 \end{smallmatrix}$ with the instruction to add, you will think of 36; but if you are asked to subtract, you will immediately think of 10. All that has been changed is your purpose or problem. This determines the direction that your mental activity will take or the ideas that will arise in the mind. The recall of ideas in memory and thought is, therefore, guided by the same factors that determine selection among the external stimuli that are presented in the course of your experience and work.

b. AIDS TO EFFECTIVE SELECTION

As already pointed out, the selection of the things attended to depends very largely upon our education and experience, our acquired habits, and the mental attitude or purpose that is held at the time. The situations in the external world, to which a student attends because of his original physiological and mental equipment, are intense stimuli, such as sharp pains and intense light; sudden stimuli which make sharp changes in the situation, such as loud noises coming in the midst of quiet; strange or unusual stimuli; rhythmic or cadenced stimuli; moving objects; recurrent perceptions; and stimuli that act as signals of organic needs. In every such case there exist in the nervous system of the individual cer-

tain connections or neural linkages that are definite and strong enough to give such situations or stimuli a distinct prepotency over all others. What these organic linkages are in any individual depends upon his race, habits, and age; upon his education and training; upon his individual experience and habits; and upon the mental attitude or purposes that have been dominant during his life. We can therefore point out in this section only a few of the factors that aid in the selection of problems and in selecting the more important details of the problems to be worked with. Our ultimate ideals and purposes have been acquired in some such ways as were described in Chapter VI.

Make an appeal to your fundamental instincts and race habits. First and foremost of these general aids to selection is learning to make the right use of the more important native tendencies to selection and response that you possess. In the performance of all your tasks you should make an appeal to the native interests that determine original selection and make it possible to release your energy more spontaneously and to direct it more effectively. Successful selection and complete and sustained attention to your tasks may be acquired by associating the thing to be done with some native tendency to response, which really means on its practical side an inner urge to mental activity in that direction. When exercised this inner urge at the same time normally gives rise to pleasant sensations. If, therefore, you make such an appeal, it will enable you not only to release more energy but to continue the mental and physical activity that produces the correct response. An example would be an instance where a child is stimulated to learn to read in order to surpass his classmates who are also learning this feat, or where a student persists until he masters a difficult and uninteresting subject in his college course because it is required to prepare for a certain professional career which naturally attracts him.

One of the best inner tendencies for a student to cultivate

and appeal to is the tendency toward mental activity of every sort, which every normal individual inherits. This makes him want to learn and to understand everything with which he comes into contact. Students do not have to be cajoled into thinking or into working with the objects and problems that they naturally select. Mental activity is its own reward. It is as natural for a student to crave knowledge, to think, to investigate, and to be curious about everything about him as it is for him to eat. Artificial incentives toward mental activity are needed only when the nature of his tasks and the requirements of society and the school are in conflict with these natural tendencies of the student. But even when a school subject or task does not instinctively attract him, a student may learn to select the right things to do and to keep himself fully and continuously applied to such a task by developing the habit and technic of asking many questions about it and by appealing to his innate desire to learn and know. This not only makes it possible for him to succeed but will keep his curiosity alive for future use when dealing with other situations and tasks.

All students and teachers should, therefore, plan to make use of the rich fund of instinctive interests which they possess as inner urges toward effective selection of certain details. They should never try to substitute more artificial incentives for these natural and spontaneous interests, because the former are never so effective for accomplishing one's purposes or aims. The particular incentives that should be appealed to will depend upon the age of the student and upon the subject in relation to which the improved habits of attending are desired. In general, appeal should be made to the instincts that are most basic and permanent and to those that are most natural to the subject or problem for which attention is desired.

Learn the value and place of forced attention. Students should also learn the true value and place of voluntary attention to a particular subject or task, for this will make them form the

habit of applying themselves more fully and continuously to any task that their individual needs or social well-being may require them to perform. They should form the habit of forcing themselves to attend fully and persistently to every necessary and ideally desirable task. If this be done, a habit will soon be formed that will direct their mental and physical energies spontaneously in the right direction.

Such a habit of *derived spontaneous* attention may be acquired (1) by making it a practice to concentrate fully and continuously upon everything at which you work; (2) by associating each new thing to be done as closely as possible with some well-established habit or basic instinct, as was pointed out in the preceding paragraph. This means making an appeal to some remote end that can for the time being be associated with the newly selected object or task. When this is successfully done, some native interest may be made the means of developing an acquired habit of complete and sustained attention to an object or task that could not be *spontaneously* selected or worked with at all. Individual effort or forced attention should therefore be used only as a *means* or as a *stepping-stone* to lead the student from what is instinctively interesting and impelling, because of his race habits, to what is ideally interesting or for the welfare of society and the race.

Make a careful analysis of your tasks. When you have thus succeeded in selecting and applying yourself completely and continuously to some ideally desirable subject or task, you still have the problem of selecting the right details in that field, those that will enable you to succeed with that particular subject or task. The best aids to this type of selection are as follows: (1) Make a careful analysis of your task, as was explained and recommended in Chapter XI. When you analyze your problem, you not only keep yourself active toward it, which favors sustained attention, you notice many new things about it, you raise numerous questions concerning it,—all of

which helps you to keep your mind fully concentrated upon the task. It also aids you in arriving at a correct solution of your problem, which because of its pleasurable results helps you to keep your mind more completely focused upon your work.

(2) A second aid to this type of selection is to get a clearer and more definite idea of your exact purpose or problem. This aids you both in making a successful analysis of your task and in selecting the right details to be worked with. Your problem if definitely stated will also serve as a standard of judgment for the various details suggested, and so for the selection of those that aid you in getting where you want to go.

(3) The habit of asking many definite questions about each object or problem that is being worked with will also aid you in selecting the correct details, for it will make you vary your responses in many directions and so prepare the way for originating the new habits that must be originated and used if you are to succeed with your tasks. Much accurate knowledge about the subject to which attention is desired is therefore helpful both for the effective selection and for complete and sustained attention to the problem selected.

Plan your tasks and work and see that a right attitude is maintained toward them. Careful planning also favors effective selection in all mental and physical work; so does a suitable general attitude toward the task. Any worker must really want to succeed with his tasks to keep himself effectively applied to his work and to make an efficient selection of the things to be done. He must believe that he can and will succeed with his work, as we have elsewhere pointed out. This means that he must plan all his tasks so that he will be able to succeed most of the time. If now in addition he believes fully in the importance of his work and feels that it is of direct personal value to him now or later, he has created a situation that is highly favorable both for complete and continued application to his tasks and for a right selection of the things to be done.

*(2) Enlarging the Scope of your Focal Field**a. ONLY ONE ITEM OR GROUP OF IDEAS CAN BE ATTENDED TO AT ONCE*

As already pointed out in section (1) of this chapter, we can attend to only one thing at a time. But if the things to be observed or worked with are familiar, the mind can be spread out, as it were, over a broader expanse of things and work successfully with more than one thing at a time.

What really happens in such a case is, however, not a division of attention, but a quick turning of the mind from one thing to another as each is being worked with or noticed in its turn while the whole group, because the items are familiar and so closely associated, is being successfully dealt with as a whole by turning attention at the right time from one object to another. For example, if a man tries to add a column of figures at the same time that he reads a poem, he will be able to succeed if he can do both things very well. What he actually does is to add several digits quickly, then turn his attention to the reading during the interval that elapses while the addition is going on subconsciously as a habitual process. When each process is sufficiently difficult to require complete and constant attention, much time is lost by attempting to do both things at once, because attention is a unitary process, or a focusing of the mind upon one thing at a time.

b. HOW TO INCREASE YOUR MENTAL SPAN OR THE NUMBER OF THINGS THAT CAN BE SUCCESSFULLY WORKED WITH AT ONCE

Special training and increased familiarity with the objects to be attended to would, therefore, not only make it easier to select them but tend to increase one's attention-span because it makes it easier to deal with these things by groups. The only way in which one can increase his mental span or the number of things that can be successfully dealt with at once is by grouping them together into larger units so that they may be dealt with as a whole. A word or four or five dots may, in

this way, be apprehended as easily by the mind as a single letter or dot, because the letters are arranged to form a familiar word while the dots are arranged in patterns which make it possible to recognize several dots at once. The law is that only one object or system of objects or ideas can be in the focus of the mind at a time.

This in the case of a child is merely one fact, one object, one condition, rather bare and unadorned. But an adult may deal with many things at once because of his familiarity with them and because they have been organized into larger units which can be handled as a whole. Every adult has acquired many mechanical habits which necessitate no attention except to start them or to overcome some special difficulty. This will be illustrated if you compare the method of reading an assignment in the way we recommended in Chapter XVII with the method of reading that must be used by a child. If a child pays attention to the pronunciation of the words or to the holding of his book or to the inflections or accent, he loses the meaning; if the meaning is in the focus of attention, these other things are almost sure to suffer. But a high-school or college student is able to select at a glance the key words in a sentence and the important thoughts in each paragraph, filling in what goes in between, thereby getting the entire thought accurately in a very short time.

Sometimes it is important to limit the range of attention in order to notice more carefully and minutely each thing to be worked with. At other times it is necessary for one to extend his attention-span because he is required to work with a number of things at once. In such cases it is helpful to be able to turn quickly from one object to another and to keep several things going at once. One should, therefore, not form the habit of definitely limiting the range of attention until he has what has been called a one-track mind, because there are times when it is important to keep many things going at once. This means that one must be able to turn quickly from

one thing to another, to organize the materials worked with, and to concentrate upon each successively until his purposes are attained.

The secret for improvement in this phase of the attention process lies, therefore, in learning to turn your mind quickly from one thing to another and in being able to focus all your powers upon the thing selected as soon as it has been brought into your mind. To organize all your knowledge and facts about important principles and to form important systems of accurate ideas about all the things that you learn, grouping these ideas in a way that will enable you to handle them successfully and always more easily, are very great aids in doing any kind of work, for this frees your mind from the oversight of details and so greatly increases the scope of your mental field or the number of things that can be successfully worked with at once. It is wholly a matter of familiarity with the things that are being worked with at the time and of the way in which these things were organized while the learning was taking place.

(3) *Intensity and Duration of the Attention Process*

After a right selection of the things to be worked with, the most important question is the completeness with which a worker's energies can be applied to this task and the length of time that he can keep himself thus completely applied to this subject or task.

a. FACTORS THAT DETERMINE COMPLETE AND CONTINUED APPLICATION TO YOUR TASKS

Nothing about the attention process is more important than to determine the factors that favor complete and continued concentration upon the things to be worked with. With a narrow range in attention there is likely to go a considerable inertia in the mental processes active at the time. An individual with a narrow range of attention is usually very

persistent; he works intensively and is relatively slow in changing from one thing to another. A person with habits that give him a wide range of attention would, on the other hand, be able to change quickly from one object to another and would never from desire dwell long or intensively on one topic.

Intensity or completeness of attention. The factors that determine the completeness with which our mental energies can be directed to the tasks selected are partly a matter of the character of the stimulus and partly a matter of the habits of work that have already been developed. If the stimulus is intense enough or if it fits in perfectly with the mental set that is dominant at the time or with our habits and training or with the inner tendencies that represent in each individual the conserved experiences of the race, all one's energies will be spontaneously applied to the task or to the subject selected.

Much also depends upon the presence or absence of other conflicting stimuli: (1) Many competing stimuli come from the external world, such as the noises of the street, the humidity and temperature of the air, too much or too little light. (2) Other distracting stimuli come from the sensations that originate within our own body because we wear tight or uncomfortable clothing or are fatigued. These and the sensations that come from other organic states force themselves into the mind and so weaken or obliterate the normal effect of the stimulus that is dominating our consciousness at the time. (3) Irrelevant ideas are also continually clamoring for the focus of attention when for any reason one's purpose or problem is not definitely and persistently enough held in mind to keep one's energies fully applied to his task.

The process of selecting an object or idea for the mind to dwell upon has been described by comparing it to a series of concentric circles such as are pictured in Fig. 12, p. 436. The central ring *X* represents the object that is being focused upon by the mind. But at every particular moment of our mental life

there are present in the margin of consciousness certain ideas that have been associated with the object or idea then occupying the focus of attention, also certain sensations coming from the external world or from our own bodies. Some of these objects (those represented by circles 3 and 4) are very vague or indistinct. Some (those represented by circle 1) are only a little less clear than our awareness of the object or thought held in the focus of the mind. These marginal sensations and ideas are constantly competing with the object



FIG. 12. Character of attention process

that is held in the center of consciousness and tend to displace it with every pulse of mental activity, as any reader may determine for himself by noting what happens in his own mind as he reads this page.

Whether the object or task that has been selected continues to hold the center of our mental regard and to receive full or only partial consideration depends, therefore, (1) upon the nature of the stimulus that has forced the selection, whether intense or weak, in sharp contrast with what has been going on in the mind before, etc.; (2) upon how well it fits in with our previous training and instincts, because these give certain things a distinct advantage over others, as we have already explained; (3) upon the nature of the purpose or problem that we have in mind at the time, and how well this fits in with our native and acquired habits. If this purpose is definite and clear and is greatly desired, it can be more firmly and consistently held in the center of consciousness.

Duration of attention. Closely allied to the problem of the completeness with which one can focus all his mental powers upon the thing selected for such special consideration is the duration of the act of attention, or length of time that an individual can keep his mind fully focused upon the thing

selected. The process of perceiving or of thinking is not a continuous process, as one might at first believe. Whatever may be the purpose of the moment, it will be noticed that one does not hold the same object or idea constantly in mind except for a very short time. "The extreme limit during which one may attend to the *same thing* or the same phase of the thing, is in the neighborhood of a second, probably less."

This may be verified by the reader if he will look at the letter P constantly for one minute and observe what really happens during this time. He will first have the letter in mind for a second or two, then he will wonder whether he is looking at it, then he will see it again, then some idea will force its way into his mind, or he will notice a sensation of strain in his forehead or eyes. When he stops to look back to see what he has actually done, he will find that his mind has been oscillating back and forth between the letter he has been trying to focus upon continuously and certain objects in his surroundings, certain sensations from his body, or thoughts and memories of various sorts. A careful experimental record of the number of things that actually appeared in consciousness would doubtless show that as many as forty or fifty different things have passed through the mind during this time.

This fluctuation of attention is particularly noticeable in children and in untrained adults. A child cannot devote his mental energies to a subject or task so completely as can an adult. Even without the presence of distracting stimuli a child's attention flits from one thing to another, dwelling but a moment on each. He is more likely to be mastered by the first ideas which the selected object suggests or by the external stimuli that keep impressing themselves upon his senses. No matter how deeply absorbed or interested he may seem to be in his play or work, he is still "all ears and all eyes" as compared with an adult. The secret lies in his lack of knowledge and training. To focus our mental energies completely upon the object or task attended to, we must continually change it

by asking numerous questions about it, we must see new things in it, and keep continually before the mind some definite purpose or end to be achieved by means of the investigation of the problem that is being made at the time. In no other way can one succeed in applying his energies completely and continuously to any object held in the focus of the mind.

Continuous attention to a topic or task is therefore possible on only one condition; namely, that the object attended to is changed every few seconds, or is being continually worked with. The chief cause for both the lack of concentration and the shortness of the period during which a task can be successfully attended to or effectively worked with is, therefore, the poverty of the mental content of the student, and the surest way to increase one's power for complete and continued concentration upon his tasks is by increasing his knowledge and experience in that direction.

The actual time that one can remain fully concentrated upon a task will, therefore, be much increased if many new facts about it are acquired and many relationships established along the specific lines where attention is desired. The more knowledge an individual has in any line, other things being equal, the more fully and constantly will he be able to apply himself to a given problem or task. Some students read over their lesson once or twice and can do nothing further with it because they have come to the end of their own resources in interpreting and applying the facts that are being presented. They can see nothing further in the material read, and as a result their minds begin to wander to other things. This is also the reason why a small child cannot remain concentrated upon a subject for more than a few minutes at a time. He has few experiences in connection with any situation. He, therefore, can see few possibilities in the subject presented, because the situation is soon exhausted for him. Because it has no real depth for him, he is affected much more than an adult by the competing stimuli that are continually coming from his general environ-

ment, from his own body, or from the associations that his mental contacts with the object observed quite naturally arouse.

Not only will knowledge and experience with an object increase one's power of concentration and the length of time that successful attention may be given to a particular object or task, but practice and habit play a most important rôle in increasing both. A student who has never formed the habit of attending consecutively to a problem for more than an hour will, despite all the demands that have been made upon him for more efficient work, find it very difficult to attend for a longer period of time. Most students have in this way acquired habits of attending that make it impossible to apply themselves effectively to a task for more than one or two hours. At the end of this time their attention begins to wander, and their period of good work is over because of the habits of work that they have already acquired. If greater efficiency is desired, a habit of giving protracted attention must be formed by the application of the laws of learning described in the preceding chapters of this book. We shall, therefore, close the chapter by attempting to show more specifically how these more efficient habits of attending may be acquired.

b. AIDS TO COMPLETE AND CONTINUED CONCENTRATION UPON YOUR WORK

Many of the factors that aid a worker in applying himself more vigorously and continuously to his tasks have already been enumerated and described. One means to this end is to seek new information in the field by asking numerous questions about it and to begin to apply what one has read on that subject, relating it to what he already knows and to other things belonging in the same general class. This would enable him to continue to see new things in the problem and so would make it possible to hold it more definitely and continuously in the focus of his mind.

Always have a definitely formulated purpose and plan for each task and for your work as a whole. This will help you to keep your mind more fully and continuously applied to your work, because it is easier under such circumstances to ask definite questions about your problems and to ignore all competing stimuli that come either from your general environment or from your own body. In fact, there is no other way of counteracting the effect which these competing stimuli regularly produce than by attending more sharply to your problem or task. The normal effect of the many distracting stimuli and of the irrelevant ideas that arise in the course of your work cannot be successfully counteracted by trying to ignore them, since this brings them more sharply into the focus of your mind. They can be successfully ignored only by attending more sharply to something else, which should, of course, be your problem or task.

Keep your purpose and plan definitely before you as you work. One of the best practical aids to complete concentration and to sustained attention would, therefore, be to keep your purpose or problem definitely and clearly before you as you work. This will enable you to pull your mind back to your problem or plan each time that an irrelevant idea or external or bodily sensation diverts it from your task. No matter how hard you try, you cannot eliminate all the external and bodily stimuli that tend to divert your energies into other channels. It is necessary, therefore, to take definite steps to overcome their normal distracting effect. The best way to do this is to develop a greater interest in your tasks and work. By getting a terse formulation of your purpose or problem, a phrase that will hold your mind more sharply on your work, you will in time be able to overcome all the competing stimuli that regularly come from external objects, from the sensations that originate in your body, and from the many irrelevant ideas that continually arise in the course of your work.

Keep your mind ever active toward each object and task attended to. As already pointed out in Chapter XVI, one of the

best ways to develop a gripping interest in your tasks is to keep yourself actively employed in that direction. Continuous attention to a task is impossible unless you keep active toward it and strive continuously to see new things in the problem that is being attacked. The surest way to develop enough interest in a task to enable you to apply your energies upon it fully and continuously is to acquire enough facts about it to enable you to ask many interesting questions about it.

Develop a definite interest in your tasks. One of the greatest possible aids to complete and sustained attention is to develop such an interest in your work as in Chapter XVI we asked all students to cultivate. Intense interest in a task means that your mind will not only turn spontaneously toward it but that it will begin to busy itself with this object as soon as it is selected. One of the surest ways of ignoring the many irrelevant ideas that keep crowding into the focus of your mind, or of negatively adapting yourself to the many external stimuli that are in constant competition with the task in hand, is to keep yourself constantly engaged upon it, so that your mind may be kept completely focused upon the work that you are trying to do.

Be definitely interested in your own advancement in learning to attend. Much also depends upon the attitude which you assume toward your personal success and toward your advancement in this type of learning. You should not only desire to make improvement in learning to attend, see clearly the personal value in making further improvements in this direction, believe in the importance of your work and in your ability to succeed in this type of learning, but aim definitely to form the habit of working intensely and continuously at *all your tasks*, trying actually to extend the period during which you can thus concentrate fully upon your work. The importance of one's attitude toward this type of improvement has been fully demonstrated by scientific experimentation. We need only add here that without such interest in your suc-

cess and a reasonably favorable attitude toward your tasks and work the most efficient habits of attending cannot be acquired. Interest in your success, coupled with the belief in the importance of your work and in your ability to succeed, greatly strengthens your intention to form the habit of working intensely while you work and of keeping yourself continuously applied to your tasks.

Eliminate as far as possible all competing stimuli. (a) External distractions. In the development of these habits much may be done by way of making the conditions more favorable for complete and sustained attention to the problem in hand. As already pointed out in Chapter XV, all external stimuli that tend to divert your mind from the subject in hand should, as far as possible, be eliminated. A quiet room reduces the number of competing stimuli playing upon your senses and so favors complete and continuous concentration upon your tasks and saves much energy, because all stimulation consumes energy whether you notice it or not. By keeping the temperature of your room as near 68° F. as possible you make conditions more favorable for complete concentration upon your work. The sensations aroused in the body by unfavorable conditions regarding temperature force attention to themselves, whereas if the temperature is normal the sensations aroused by this factor in your environment will be pleasant and therefore favorable for continued application to your work. The same thing is also true in regard to light, to moving objects, etc. which force themselves upon your attention.

You should therefore select a place where there will be a minimum of disturbance from these sources. If you work in the library, you should sit where the movements of the people who are continually coming and going will not directly impress your eyes. You should also sit with your back to the light, to prevent unnecessary fatigue and needless strain on your eyes, for such conditions soon give rise to bodily sensations that

force themselves into the focus of your mind and divert your energies completely from your problem to themselves.

It is indeed possible by keeping the conditions for study and work uniform (as is done when we form a definite time-and-place habit for study) to make this group of stimuli an aid to complete and sustained attention. As the author has elsewhere pointed out,¹ the sensations that come from our general surroundings may, if kept entirely uniform, aid in producing the exact responses that we are required to make in doing our work. Under certain conditions they facilitate the mental and physical processes then going on. At other times they act as a spur to the nervous system, causing greater activity which may be turned in the right direction, similar to the response of a horse to the whip at a critical time. It should, however, be remembered that such distractions always increase fatigue and, therefore, eventually reduce the amount of work that can be done. They may at times produce a favorable effect because they spur the worker on to greater effort.

(b) *Eliminating bodily sensations that divert attention from the task in hand.* More compelling still are the sensations that come from fatigue and from other physiological conditions of the body. Wearing tight shoes or uncomfortable clothing will give rise to a group of bodily sensations that force attention to themselves and so divert the worker's energy from the task in hand. This is nature's way of getting the cause of the disturbance removed. Even if one should succeed in keeping attention focused on his tasks, the sensations that come from the pain in the feet, from ill health, from the loss of sleep, or from overstrain of the body or eyes will wear him out unnecessarily even if they do not force him to attend directly to them. For this reason such disturbing and injurious sensations should be prevented as far as possible. You should see that your study chair is comfortable, your study table of the right

¹ Compare W. F. Book, *Learning to Typewrite*, chap. v, pp. 114-117. The Gregg Publishing Company, New York, 1925.

height, your clothing so comfortable that you do not know you have it on. You should make it a point to close your eyes occasionally to give them the needed relaxation and rest; you should also take regular periods for general relaxation in order to prevent unnecessary fatigue and its many evil and distracting effects. Even the rules for getting enough rest and sleep to keep you in first-class physical condition, as set forth in an earlier chapter, should be religiously obeyed, because they constitute one of the necessary conditions for the most effective work.

(c) *Avoid irrelevant ideas and adjust yourself to those that cannot be eliminated.* As already pointed out, the only way to avoid the distractions regularly produced by the free play of the associations to which the normal activity of your mind quite naturally gives rise is to keep your problem or purpose more definitely and constantly in mind as you work. The fact that your purpose has been definitely formulated and carefully phrased enables you to hold it more constantly in mind and to pull your mind back more promptly to your work whenever irrelevant ideas divert it from your task. Having such a definite purpose or plan in mind helps to determine the general course that these free associations will take and so aids in attaining your goal, because more pertinent and helpful ideas are suggested when your problem is kept definitely and clearly before you as you work.

Form habit of getting clear ideas about each thing that you work with. Deficiency in knowledge always prevents effective and continuous attention, because you can attend but for an instant to something that is new or vaguely understood. This is why a child cannot concentrate so completely or long on any object or task as can an adult. He has less knowledge about it, and all his ideas are more or less vague and incomplete. One aid to efficient and sustained attention is, therefore, to get clearer ideas about everything that you work with. Any object or problem that is being attended to must be continually worked

with or manipulated so that it will constantly be appearing in a new light and therefore grow in significance as you proceed. As has already been demonstrated, the only way that you can keep any object in the focus of your mind is to keep doing something definite with it.

Make a careful inventory of the habits of attending that you already possess. Lastly, to learn to attend in the most effective way not only must you ascertain what you should do to acquire this favorable set of habits, and determine how each may best be formed and fixed, but you should begin by making a careful inventory of the habits that you already possess along this line. If wrong habits of attending have already been formed, they must be broken up or eliminated before or while the more desirable habits are being established. It is therefore almost as important to know what habits must be eliminated in your own particular case as to ascertain what you must do to achieve success in this type of learning. This is true because every wrong habit of work that you have formed represents a difficulty that must be overcome in acquiring the desirable habits you wish to establish. The wrong and undesirable habits that you already possess should, therefore, be carefully listed and systematically overcome as the steps enumerated above are taken to acquire the habits that must be formed to enable you to apply all your energies and powers to your tasks and work.

3. EFFICIENCY PRINCIPLES INVOLVED IN LEARNING TO ATTEND

For the acquisition of these more effective habits of attending, most of the discussion given in preceding chapters of this book has already prepared the way. When you acquire the ability to read effectively, to memorize new knowledge and facts more economically, to investigate a problem successfully, to plan and schedule your work and to work your plans, to

think and reason more effectively, to conserve and effectively use your energies and time, to formulate and follow right ideals, and to work according to a carefully formulated written plan, you are acquiring the ability to select your problems in a more effective way and to keep yourself more fully and continuously applied to your tasks. In other words, the whole problem of personal efficiency in study and work starts with attention, or the process of selecting the things that should be noticed and done, and ends with the establishment of the habits that enable you to apply all your mental and physical energy more fully and continuously to the tasks that you have elected to perform.

Personal efficiency may, therefore, be defined as acquiring the ability to select more wisely your problems and tasks and to apply all your energies and powers more effectively to the solution of the specific problems and tasks which you have to perform. This ability is in turn dependent upon the particular habits which we have tried to describe throughout this book. Without the acquisition of these and other habits that enable you to select more wisely your problems and tasks and to use your energies and powers in the most economical and effective way in the performance of these tasks, real efficiency in study and other lines of work could never be attained. If the author has in any degree made clearer just what these necessary habits are, or how they may best be formed and fixed, the chief aim of the book will have been realized.

EXERCISES AND QUESTIONS ON THE TEXT

1. Explain just what attention is on its practical side. How is it related to effective thinking and efficient work?
2. What happens when you try to concentrate fully upon a particular object or thought? (Compare section 1.)
3. Name and briefly explain the four divisions of the attention process.

4. Name and briefly explain six factors which determine selection among stimuli or which give one situation or stimulus a prepotency over all others.

5. What on the organic side really determines what situations or stimuli will be mentally selected or attended to?

6. What determines the process of selection in the realm of ideas?

7. Name and briefly explain the most important aids to effective selection during mental and physical work.

8. How may we proceed to increase our mental span or the number of things that can be successfully worked with at one time? What is the real secret for improvement in this phase of the attention process?

9. Explain what is meant by intensity of attention or complete concentration of our mental powers upon the thing selected for special consideration.

10. What factors determine the completeness with which one's mental powers may be applied to a given object or task?

11. What determines the duration of attention, or length of time that one can keep his energies thus fully applied to a particular task?

12. List and briefly explain all the important aids for more complete and continued concentration of your mind upon an object or task.

13. Which of the efficiency principles discussed in this book are chiefly concerned with acquiring the habits that must be established in learning to attend?

REFERENCES

- JAMES, WILLIAM. Talks to Teachers on Psychology, chaps. x-xi. Henry Holt and Company, 1916.
- KITSON, H. D. How to use your Mind, chap. vi. J. B. Lippincott Company, Philadelphia, 1916.
- PILLSBURY, W. B. Education as a Psychologist sees it, chap. viii. The Macmillan Company, New York, 1925.
- PILLSBURY, W. B. The Psychology of Attention. The Macmillan Company, New York, 1908.
- WOODWORTH, R. S. Psychology, chap xi. Henry Holt and Company, New York, 1921.

PART V

DANGERS OF PSEUDO-EFFICIENCY IN LEARNING TO
STUDY AND WORK

CHAPTER XXII

NEED FOR DEVELOPING THE ABILITY TO DO ORIGINAL AND CREATIVE WORK

Thus far in our treatment of the problem of learning to work in the most effective way special consideration has been given to the principles and habits that make one effective in the performance of particular tasks. There are, however, two important sources of advancement in any case of learning and in life: The first consists of the gains made by the formation, improvement, and fixing of definite habits of thought and work or systems of such habits. This makes for perfection and consistency in response, reduces certain of our acts to the level of automatic performances, and frees the mind for doing other and higher things. There was a time, for example, in the life of every individual when it took all his powers of mind and control to stand, to walk, to dress himself, or to make his simplest wants known by means of speech. With practice and the fixing of certain habits these acts soon come to be performed almost perfectly and without conscious direction or voluntary control.

The second and chief source of advancement in learning and in life consists in increasing one's initiative, one's spontaneity, one's ability to do original and creative work. In learning to typewrite, for example, the learner must first take five steps in locating and striking each letter to be made on the machine. These five steps soon come to be fused into one so that each letter can be made directly on the machine as wanted. Later, certain letters are combined and reacted to as a group. In this stage the process of initiating and controlling the order

and character of the movements required to make this group of letters can be controlled as a unit or handled just as easily as the single letter-making movements were controlled at a lower level of skill. Still later, a series of closely associated words comes to be handled in this unified way because a still higher order of habit has been established. Real efficiency in learning to study or to do other types of work consists therefore in the main of acquiring the ability to make continually such improvements in one's methods of work as the learning proceeds.

Man is and should always strive to be more than a mere machine that works perfectly when confronted by its tasks. He is the type of machine that can and should invent new procedures, new methods, more economical ways of doing the things he wants to do, an organism that can originate and select the best methods of doing what he wants to do, an organism that can make new and effective short cuts in his thinking and in his methods of work, an organism that can do things that make for greater economy and efficiency than any facilitation that can come from the mere fixing of any set of habits that could be acquired, unless it be a set of habits that would enable one to do effectively just this particular type of thing.

1. DANGERS OF OVERSTANDARDIZATION, EXTREME ORDERLI- NESS, OR PSEUDO-EFFICIENCY

Slavery to any set of habits or to standardized procedures, acquiring the habit of doing effective but mere conventional thinking, or becoming mastered by habitual activity of any sort would mean that the most important door to human efficiency and progress had been closed.

Pseudo-efficiency would surely result if one should emphasize the acquisition of the habits that make for greater efficiency in the performance of specific tasks to the neglect of

that other set of habits that enable him to originate new and better methods of work in every field of human activity. Any habit that makes for greater efficiency in the performance of one's regular tasks is, of course, a blessing to the one who has formed it, because of the facilitation that comes through the fixing of such habits and the consequent freeing of one's mind from its control over that activity. But mere habituation, or the fixing of habits, tends to destroy one's spontaneity and power to do original thinking and creative work. This hampering effect of habit and the inhibitions produced by the formation of any habit or series of habits are too often ignored by writers on personal efficiency and by the "how to study" books. The fact is that any student or worker is likely to be mastered by the law of habit and so to lose some of his initiative, some of his powers of spontaneous thought, and thus to dull his powers of creative activity in any field. Undue emphasis upon the use of standards, schedules, and plans, or a slavery to any set of standardized rules or to conventional activity of any sort, will inevitably have a dulling, sterilizing, and inhibiting effect upon an individual's highest efficiency, since it eliminates the possibility of engaging in original or spontaneous activity of every sort.

2. NEED FOR CULTIVATING ONE'S INITIATIVE AND POWERS OF ORIGINAL AND CREATIVE THOUGHT

There is special need, therefore, for developing one's initiative, one's powers of spontaneous thinking, or for acquiring a set of habits that will make one truly creative and original in his thinking and work, because this is the most important source of improvement in all individual and social advancement.

Each worker should really set aside a definite time each day and week during which he would give free rein to his imagination and thoughts, a time when he would be unhampered by

any rules of study or methods of work ; a period that would be given over entirely to a sort of unsystematic, desultory, planless mental activity that would exercise to the fullest possible extent his mental initiative and powers of spontaneous thought ; a time during which there would be a total disregard for rules, a healthy revolt against all conventional thought and against all regulations set by society or by one's systematic habits of work ; a time when there would be an actual breaking away from all set habits or uniformity in thought and when there would be the freest possible play of one's imagination and thoughts, for this is needed to form the kind of habits that make one truly inventive or ingenious in his thinking and work.

When engaged in this type of activity¹ it is desirable, even necessary perhaps, to have some vital problem in mind to work upon, and to let one's imagination and thought play around this problem as he thinks and works. Or the necessary stimulus to start and to keep this sort of mental activity going may be obtained by reading. But in any case one should be absolutely free to choose his reading and give a free rein to his mind so that a habit of being original and truly creative in one's thinking and work might be formed by exercising the particular mental powers that should be cultivated.

The importance of thus conserving one's initiative and of cultivating his powers of original thought is clearly indicated by the place that this element in human advancement and learning occupies in personal achievement or by the marked results that have been attained by the men and women of all times who possessed and used this type of mental activity to a

¹ Just how one may proceed to make himself more ingenious and inventive during such periods of work cannot be fully explained in our present state of knowledge. The author hopes later to show in another book — after the subject of problem-solving learning has been experimentally studied and the laws that govern this type of learning have been more definitely determined and verified — just how this may be done.

marked degree. Many of them developed it to the neglect of the gains that might have been made through the acquisition of the specific habits that have been described in Parts II, III, and IV of this book.

History and biography are replete with the names of men and women who have achieved distinction in various fields of human achievement because they were particularly gifted in this regard or because they had developed this aspect of their mental life to a marked degree. Many of these men and women were so original and different that they could not conform to the ordinary traditions of society. Some could not even profit by the standard procedures of school. In fact, most of the geniuses of the world have so emphasized this inventional side of their life or had their creative and spontaneous powers of thought developed to such a marked degree that they could not help making important contributions to the world. Most of these so-called geniuses were in the habit of giving such a free rein to their minds and to the normal tendency toward desultory and unsystematic mental activity that they could not make the ordinary adjustments needed to make a living or to win a place for themselves in the social and educational world in which they lived. But, notwithstanding this fact, some of the most important achievements in every field of human activity have been made by this type of individual at every period of history, because of the special importance of this inventional side of the learning process.

This result has led many persons to stress unduly this erratic and unsystematic type of procedure in thinking and work and to consider it the most important and universally desirable course of action in attaining personal efficiency in one's work or in life. But where this is done, a very important element in attaining the greatest human efficiency is neglected; namely, the group of factors that make for stability and facilitation in our life and work, or the factors that enable one to save enough energy and time to cultivate and exercise

in the proper way this unsystematic side of one's life. The plain fact is that both groups of factors here discussed, the facilitation that comes through the establishment of useful habits, and the power to originate new and better methods of work, are needed to attain the highest type of human efficiency in life or in our work, as the author has tried to indicate throughout this book.

3. RELATION BETWEEN FACILITATION AND ORIGINALITY IN THINKING AND WORK

(1) *Place of Facilitation in Learning to Study and Work*

The facilitation that comes from the establishment of effective habits for work may be made an aid for the cultivation of one's initiative, originality, or ability to do original and creative work in the following two ways: (1) The formation of such effective habits of work saves much time and energy that may be set aside and used for the special exercise or cultivation of one's powers of spontaneous and original thought. (2) The knowledge and skills so acquired may be learned in a way that makes it possible to use them in other situations besides the ones in which they were originally learned.¹ The facts acquired and the useful habits established should be used as data and as elements in constructing higher-order habits. These facts and skills really constitute the materials that must be used when one learns to meet a new situation successfully or when one learns to solve the many problems encountered in his work, always in a more effective and economical way. As a matter of fact, all specialized modes of skill that make for effectiveness in the performance of specific tasks may and should be acquired in a way that would increase one's initiative, his inventiveness, or his power to readapt

¹ Compare on this point the discussion on "Learning to Reason" in Chapter XX of this book.

himself to his present surroundings or tasks. One's knowledge and special skills if properly acquired make it possible to do original and creative work because they constitute the materials out of which all new adaptations in thinking and in methods of work are constructed.

True learning does not consist merely in establishing certain habits or sets of habits that facilitate one's control over the performance of particular tasks or of specific kinds of work, but in acquiring in addition to such habits of control a set of habits that will enable one to reconstruct his methods of work continually as he goes along, or in acquiring the ability to meet always in a more effective and economical way every situation and the problems encountered in his work.

To be truly efficient every worker must therefore learn to utilize his initiative, his powers of spontaneous action and thought. He should never acquire the special skills that enable him to perform specific tasks at the expense of his initiative, his inventiveness, or his power to make readaptations in his present methods of work. In other words, making oneself truly efficient is not getting oneself ready for doing something that should be done better at some future time, but learning to do, and always doing, one's work in a way that will enable him to make continual reconstructions in his methods of work as long as further improvements are possible.

(2) Value and Use of a Reserve of Energy and Time

It is also important to emphasize that it is only through the facilitation that comes from the development and mechanization of the useful habits formed in connection with one's regular work that he can save the energy and time needed to cultivate in the proper way his ability to do original and creative work. This surplus of energy and time which comes from learning to do one's regular work in the most effective way is needed (1) in order that one may make new adapta-

tions in connection with one's regular tasks and work ; (2) in order that one may have the time and energy needed to make a systematic analysis of one's tasks, for this not only makes one more successful in his regular work but gives much exercise to the habits that make it possible to do original and creative work ; (3) in order that one may have the energy and time needed for the special cultivation and exercise of the habits of action and thought that make it possible to do original thinking and creative work.

Throughout this book the author has pointed out how important it is for every student and worker to be creative and original in connection with his regular work. But one's regular tasks do not always offer sufficient opportunity for the proper cultivation of his powers of spontaneous thought or for the origination and proper exercise of the habits that make one truly original and creative in his thinking and work. A certain reserve of energy and time, a sort of mental sinking-fund, is needed to prepare oneself for doing the best type of original work. In fact, experiments in learning have shown that new adaptations, successful variations, or the better methods of response that are continually invented as the learning proceeds are originated and selected for future use only when the person is in first-class mental and physical condition and putting forth his utmost efforts on his work.¹ These experiments have clearly shown that such improvements come about only through the spontaneous variations that are made at such a time. Without a surplus of energy at the learner's disposal such innovations in response have not been made, probably cannot be made. It is the animal that has the most persistence and "pep" that succeeds in originating new and more economical modes of response as the learning proceeds. The same thing is true in human learning and in life. The ability to make new adaptations in method, the power to meet an emergency in a

¹ Compare W. F. Book, *The Psychology of Skill*. The Gregg Publishing Company, New York, 1925.

new and successful way, is dependent upon a certain reserve of energy which enables one to vary his responses in a large variety of ways or until such a new and more economical method of work can be originated. The invention and selection of such new and better methods of work are conditioned, to be sure, by other factors, as the author has elsewhere pointed out,¹ but the surplus of energy which comes from the ability to perform one's regular tasks in a more economical and efficient way is an essential element in the whole situation. If this has not been provided for, by learning to do one's regular work in an economical way, this road to the highest personal efficiency will be closed to the learner unless perchance he uses all his energy for such spontaneous activity, as many geniuses have done, leaving someone else to take care of his personal needs because he is unable to do both these things.

4. RIGHT ATTITUDE TOWARD THE PRINCIPLES OF PERSONAL EFFICIENCY DISCUSSED IN THIS BOOK

The principles of efficiency and the specific sets of habits described in Parts II, III, and IV of this book should therefore be made a means for attaining greater initiative and more originality in our thinking and work as well as greater success in the performance of our regular tasks. They should be considered as parts of the necessary equipment for learning to do real creative work in our vocation or in some avocational line. Because of their general value and unique place in any program for making oneself truly efficient it is important to develop a right attitude toward them. The reader should clearly understand that the habits described in this book should be considered merely as aids for obtaining the extra time and energy needed to permit one to make himself more original and creative or truly efficient in his actions

¹ See W. F. Book, *Learning to Typewrite*, chaps. vi-vii, pp. 119-150. The Gregg Publishing Company, New York, 1925.

and thought, and that the skills and controls which they represent constitute the materials out of which the higher-order habits are constructed. They therefore make good servants but would make a very bad master if made an end in themselves. It should always be remembered that true efficiency in the realm of mental activity and control cannot be attained unless the plans, methods of work, and habits of efficiency described in the earlier chapters of this book are made a means for attaining one's highest ideals and purposes in life, one of which should certainly be to make himself always more original and creative in his thinking and work.

To make any of the means to personal efficiency described in the earlier chapters of this book an end in themselves would be to miss the road we have been trying to mark out for the reader throughout the book, a road that should be so clearly pointed out to every pupil in the public schools through the directions given him by his teachers, and through the supervisory work that his teachers attempt to do, that all would acquire through their own efforts, and as a matter of course, the particular habits of thinking and work for which the author has been pleading throughout this book.

EXERCISES AND QUESTIONS ON THE TEXT

1. Name and explain the two important sources of advancement in any case of learning and in life. What is the relative importance of each of these factors?
2. How might pseudo-efficiency in our personal work and in life be produced?
3. Why is it necessary to cultivate one's initiative and powers of original and creative thought? How should one who really desires to conserve and cultivate his powers of original thought proceed?
4. How is the group of factors that make for stability and facilitation in learning and work related to the factors that make for originality in one's responses and work?
5. Explain the place of the facilitation that comes from the formation and fixing of habits. In what does real personal efficiency consist?

6. Why is it important to create a certain reserve of energy and time by the use of the methods and means discussed in preceding chapters of this book?

7. Why is this surplus of energy and time needed by all learners and workers to make their efforts most economical and efficient?

8. What is the most helpful attitude to assume toward the principles of personal efficiency discussed in this book? Why?

9. Why should the principles of personal efficiency described in this book be made a means instead of an end in themselves?

REFERENCES

BOOK, WILLIAM F. *Learning to Typewrite*, chaps. iii-vii. The Gregg Publishing Company, New York, 1925.

KNOWLSON, T. SHARPER. *Originality*. J. B. Lippincott Company, Philadelphia, 1918.

LEWISOHN, LUDWIG. *The Creative Life*. Boni and Liveright, New York, 1924.

RIBOT, TH. *Essay on the Creative Imagination*. (Translated from the French by A. H. N. Baron.) The Open Court Publishing Company, Chicago, 1906.

CHAPTER XXIII

TRUE BASIS FOR SUPERVISED STUDY

1. AIM OF SUPERVISED STUDY

One of the chief aims of the study and work done in the schools is to acquire certain knowledge and facts that may prove useful in the solution of the many problems that are encountered in later life. But what is of still more importance is to acquire this information and knowledge in such a way that there will be developed in the learner at the same time the ability to work at all his tasks in an effective and economical fashion. One of the most basic laws of life is that we grow along the exact lines in which we have exercised our mental and physical powers. This is true of learning taken in the sense of acquiring a specific habit or definite set of habits. It is also true of the more general types of improvement called physical or mental development. The only way to develop a specific habit or power is to exercise the particular habit or ability to be acquired.

If this be true, the most important thing in education is not the mere acquisition of the things that are taught in the school, but the way in which these things are done: how students apply themselves to their tasks while these subjects are being mastered, or the habits of application and work that are being developed while this learning is taking place.

Throughout the history of educational endeavor much emphasis has rightly been placed on the *way* in which the learners do their work, because it has long been recognized by the ablest leaders in the field that *how* a thing is worked at is of more importance than *what* is actually being done or learned.

This is true because the method of work employed by a learner in the performance of his tasks develops as a natural by-product certain sets of habits that make him personally efficient or inefficient in the performance of his future tasks. The particular use he can make of his mental and physical powers when doing his work will, therefore, depend upon the ways in which they have been exercised or used up to that time.

If this be true, one of the chief duties of a teacher would be to direct the efforts and work of his pupils, from the very beginning of their school career, in such a way that the most effective habits of work would be acquired and firmly established by the continued practice that comes from doing all their work in the right way.

The specific habits that will naturally be formed if children and students are properly directed and supervised in school have already been described in Parts II, III, and IV of this book and need not here be enumerated or even reviewed. The value of such an array of habits to any individual who desires to make the best contribution to society and the world that it is possible for him to make has repeatedly been suggested and emphasized throughout the book. The important point to remember is that it is far more important for students and children to learn to do their work in ways that will establish these efficient habits of work than to learn the specific things that we teach them in school. This is true because the former insures the acquisition of a hierarchy of habits that will enable them to work at all their tasks in the most effective way, including the ability to determine the true purpose of their study and work and so to select the right things to do. The latter merely results in the acquisition of certain bits of information that are rarely remembered and almost never used.

It is the author's thought that all students and workers should learn to work in such a way that the habits which spell efficiency in every line of work would be acquired and definitely fixed more or less incidentally in the course of their regular

school experience. And if this be true, the chief problem of the teacher would be to supervise and direct the work of his pupils in such a way that the habits which insure such effective application of their energy and powers would be firmly established at the proper time.

2. CURRENT METHODS OF SUPERVISED STUDY INADEQUATE

Much has recently been written on supervised study and on the methods of work that are used by students in high school and college today, or that should be used by students to obtain the best results in their work. Hall-Quest in his recent book on the subject gives a list of one hundred and forty-eight books and articles written on this subject before 1919. By supervised study the best writers in the field have meant some "plan of school procedure whereby each pupil is so adequately instructed and directed in the methods of studying and thinking that his daily preparation will progress under conditions most favorable to a hygienic, economical, and self-reliant career of intellectual endeavor." What is aimed at in the best schemes of supervised study that have been suggested and used is the production of "an individual who is trained to attack problems, and to organize his experiences into larger controlling concepts, and who has somehow acquired enough initiative and self-directive force to serve without merely doing what he is told to do"; in other words, the production of an individual who has learned how to work at all his tasks in the most effective way.

But most persons, even the teachers who conduct this supervisory work, have a very different point of view. To them supervised study means some scheme whereby students can be made to do a little more or a little better work in the particular subject that is being supervised. The proof for this statement is the great bulk of material that has been gathered to show the value of supervised study by making objective

measurements of the records made in various school subjects by typical classes that have been working with and without such supervision of their work. To these teachers supervised study too often means merely acquiring a more efficient method of preparing the work in the particular subject that is supervised. In other words, the actual methods that have been invented and used for the supervisory work done in the schools have fallen far short of the best theory in the field. Too often they have degenerated into a series of mere devices which aim to help students make better grades in their work, instead of developing the habits of thought and work that would enable them to perform all their tasks in the most efficient and economical way.

If study may be defined as the process "by which a given bit of subject matter is converted into ideas that shall be effective in the subsequent life of the student and by which at the same time the mental capacities of this student are exercised in right habits of mental work" this more common and prevailing method of supervised study is entirely inadequate. The supervisory work should be carried on not only in a manner that would enable the learners eventually to work at all their tasks in the most economical and effective way but in a manner that would develop initiative, the power to do original thinking and to do creative work. To do anything less would make for pseudo-efficiency in the learners we seek to direct.

3. TRUE BASIS FOR THE MOST EFFECTIVE SUPERVISORY WORK

For a teacher to be able to give the type of supervision that a student needs to learn to work in the most effective way or that a student needs to enable him to direct *himself* in this type of learning, he should know (1) the exact habits that must be formed and fixed, or what must actually be done to achieve the desired result; (2) the best order and way of establishing these necessary habits; (3) the more important aids to their

formation and establishment ; (4) the most serious difficulties that a learner encounters in developing the habits to be formed, and how each of these difficulties may best be avoided or overcome ; (5) how a learner's progress in each important source of improvement may be measured ; and lastly, (6) how a learner must proceed to develop an interest in all his tasks and in this type of learning in particular. Definite information along all these lines has been given in the chapters which precede. If it will aid workers or teachers and students in establishing some of the specific habits that must be formed in learning to work in the most effective way, the fondest hopes of the author will have been realized.

EXERCISES AND QUESTIONS ON THE TEXT

1. What is the true aim of supervised study? Illustrate.
2. Why is it important to pay particular attention to the way in which we do our work? Is this way more important than the results we obtain from our work in school?
3. So far as the direction of his learners is concerned, what is the chief function or duty of a teacher?
4. What helpful habits of work would be formed if children in school were properly directed and their work rightly supervised from the very beginning?
5. Why are current methods of supervising the study and work of pupils in school inadequate? To what end should the supervisory work be carried on?
6. What is the real basis for the most effective supervisory work?

REFERENCES

- BRESLICH, E. R. "Teaching High School Pupils to Study," in *School Review*, Vol. XX, pp. 505-515.
- EARHART, L. B. *Teaching Children to Study*. Houghton Mifflin Company, Boston, 1909.
- HALL-QUEST, A. L. *Supervised Study*. The Macmillan Company, New York, 1919.

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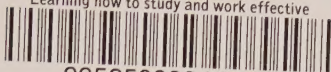
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